THE SCOTTISH GEOGRAPHICAL MAGAZINE

Volume 73, No. 3 December 1957

THE TEXTILE INDUSTRIES OF DUNFERMLINE AND KIRKCALDY, 1700-1900
W. H. K. Turner . . . . Illustrated 129
LIVESTOCK AND FORAGE PRODUCTION IN CENTRAL MACEDONIA
Anne Prentice . . . . . Illustrated 146
CHANGES IN THE GEOGRAPHY OF TRINIDAD
Preston E. James . . . . Illustrated 158
THE ROADS OF SCOTLAND. II. STATUTE LABOUR ROADS: THE SECOND PHASE
Donald G. Moir 167
CERTAIN ASPECTS OF VEGETATIONAL HISTORY IN NORTH-EAST SCOTLAND
S. E. Durno . . . . . Illustrated 176
GEOGRAPHY AT THE BRITISH ASSOCIATION
J. B. Caird 184
ROYAL SCOTTISH GEOGRAPHICAL SOCIETY TOURS 185
REVIEWS OF BOOKS 186
CONTRIBUTORS TO S.G.M. 73 (3) 145
GEOGRAPHY APPOINTMENTS IN SCOTTISH UNIVERSITIES, 1957 . 145
ROYAL SCOTTISH GEOGRAPHICAL SOCIETY
Proceedings 190
Annual General Meeting 190
Lecture Session, 1957-58 190
Report of Council 191
List of Current Publications in Library vi

THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY
EDINBURGH

The Commercial Bank of Scotland Limited

ESTABLISHED 1810

✦

Funds exceed £150,000,000

✦

HEAD OFFICE

14 George Street, Edinburgh

General Manager: Ian W. Macdonald

Modern banking services are available at the Bank's Branches throughout Scotland and in London. Credit facilities for commercial, industrial and farming development, on convenient payment plans, are also available through the Bank's subsidiary,

THE SCOTTISH MIDLAND GUARANTEE TRUST LIMITED

THE SCOTTISH
GEOGRAPHICAL
MAGAZINE

Vol. 73, No. 3 December 1957

THE TEXTILE INDUSTRIES OF DUNFERMLINE AND KIRKCALDY 1700-1900

W. H. K. Turner

One of the problems that confront geographers is that of determining how best they can approach the analysis of distributions of industry. For the human geographer, whose field of enquiry is wide, this problem is not the same as that for the economic geographer, whose researches are more specialised. In particular, urban distributions of industry call for investigation by the human geographer, in a manner sufficiently selective to emphasise only those points which have had principal importance in inspiring urban growth, and in influencing the mode by which the town has acquired such regional status as it may possess. In any comparative study of towns emphasis should be placed on such qualities of distinctiveness as might contribute most to a sense of variety in the region within which they are placed. If this is accepted, then, with towns whose significance has been acquired mainly or wholly as textile manufacturing centres, a principal line of enquiry is that which selects for analysis the character of textile production. Marked dissimilarity in this not only in itself contributes to a sense of regional variety, it may also influence the chronology of industrial growth, and affect variously the susceptibility of urban industry to change according to altered circumstances of marketing and trade. Equally important, and deserving of attention, are the internal contributions made by industrial growth to the towns themselves. In particular, urban industrial distributions, and the manner of their evolution, call for analysis ; and, as these are the product of historic change, inevitably there is involved the need to apply a chronological approach.

The greater part of the modern development of Dunfermline and Kirkcaldy was inspired by the contemporary rise of textile industries very different in character. These, now diminished in stature, grew intensely in the period 1700-1900, and no significant addition to the distribution of these industries in the towns has been made in this century.

The general background against which one should examine the divergent tradition of textile workmanship in Kirkcaldy and Dunfermline has been sketched elsewhere [1]; and there is little point in repeating familiar material concerning the activities of the Board of Trustees, or the provisions of the Bounty Act of 1742, all-important though these were in stimulating, through subsidy and incentive, the growth of Scotland's linen industry in the eighteenth century. The concern here is solely to indicate particular features of the industries of both towns, to show the extent of their differences and the manner of their growth. The major differences were already present by the time the Board of Trustees for Manufactures initiated their supervision of the linen industry. Fine table linens were early the specialty of Dunfermline and coarser, medium-weight fabrics that of Kirkcaldy, productions which were quite distinctive within the linen manufacturing region of east-central Scotland, and equally distinct from each other.

It is easier to date this divergence than to account for it. It appears that the original regional staple of southern Fife was ticking and checks, and to this was added in Dunfermline huck-a-buck, diaper and finally damask.[2] Fine linens were already made in Dunfermline by the early eighteenth century, for Sibbald had noted here in 1710 the manufacture of " dornick cloath "—interpreted by Johnson to mean table linen. Damask weaving was introduced about 1718, credited to James Blake, who, it is said, illicitly learned how to construct the loom and work it while employed in Edinburgh, where damask weaving then was a close-guarded secret.[3] Certainly by 1723 there was " a very considerable Trade of Table Linnen . . . made and sold here in great quantity, at six yearly faires." [4] Setting a seal on this developing tradition of high craftmanship was the establishment in 1749 of a large weaving concern in the town by the British Linen Company.[5] With this, though some medium quality linens continued to be made, Dunfermline's reputation as a centre for damask production was firmly established, while in Kirkcaldy the making of ticks and checks remained the staple.

With manufacturers in both towns firmly wedded to the making of different quality cloths by the middle of the eighteenth century, the latter part of that century saw these divergent weaving traditions encouraged with the development of the great London trade. Previously most goods had been sold to Edinburgh and Glasgow merchants and at the national fairs.[6] The industries now, however, expanded considerably for export, moved by a common stimulus but proceeding along dissimilar lines. Thus James Fergus of Kirkcaldy, one of the principal manufacturers of the town, began making ticking on a large scale for the growing English markets of the period,[7] notably for London whence there was considerable re-export to the West Indies and America. By the end of the century three-quarters of all the cloth then made in Kirkcaldy and bought from the neighbourhood was sold in England, an eighth went to Glasgow for export and an eighth was bought locally.[8] Similar developments took place in Dysart, whose fortunes by this time were closely linked with those of its larger and

more powerful neighbour. Meantime much Dunfermline linen was sent from Torryburn to Bo'ness to be shipped to London.[9]

The nineteenth century was important for a number of changes then introduced. The most notable of these was the change-over from handicraft to power industry, and the greatly increased production that this made possible in a period of rapidly extending markets. This transition had begun in the last years of the eighteenth century when the Glasgow cotton region spread its influence eastwards. Cotton working was introduced to both towns, particularly to Kirkcaldy where jennies in the town and water-powered spinning mills nearby produced yarns which were woven into plain and union cloths. Local cotton working at this time was only a minor feature—most notable for shirtings in Kirkcaldy—but its importance elsewhere had certain repercussions on the character of textile production in southern Fife. In particular, Kirkcaldy's old trade in linen checks was affected. Cotton checks, some of them made in Fife, were already capturing foreign markets by the eighteen-thirties, and the earlier importance of linen check weaving was thus greatly reduced.[10] But, apart from this, the introduction of cotton did little to affect the traditional character of linen working in both towns. Cotton weaving in the nineteenth century was a supplementary activity ; it was only in the twentieth century that it assumed importance. Kirkcaldy's staple throughout much of last century was linen ticks, with also drills, dowlas, sheetings, ducks and sailcloth—medium and heavy flax cloths differing notably from the fine damasks of Dunfermline. Jacquard weaving had begun in Dunfermline in 1825, facilitating the elaboration of pattern and design that had become so distinctive a part of the town's high quality productions during a century of increasing specialisation. This, at a time when machine spinning of fine, wet-spun flax yarns was first becoming important, gave a considerable fillip to the damask industry. By 1836, of the 3,517 looms in and near Dunfermline 3,000 were for damask weaving and 517 for diaper.[11] Five years before the successful introduction to Dunfermline of power-weaving Chalmers wrote, "In no other part of Scotland does the traffic in this article exist, although in one or two places a few looms are to be found."

While it is true that the outstanding feature of the textile industries of both towns is their divergent tradition of workmanship, it would be false to represent this difference as one which, for the whole of the period under review, was entirely clear cut. In particular, damask working, hitherto restricted almost entirely to Dunfermline, achieved a wider distribution from about the middle of the nineteenth century. With demands for linen damasks increasing greatly in the latter part of the nineteenth century, in response to rising standards of living and increasing wealth, there was a strong economic incentive for the spread of the industry. Following nearly a century and a half when weaving skills, strongly localised while employed on hand-craft production, had served to restrict the making of fine quality cloths to particular areas, the application of steam-power to weaving provided the opportunity for spread. Given both motive and opportunity, damask weaving in new power-loom factories evolved in a number of places

in Fife and also in Perth, and notably, so far as this study is concerned, in Dysart and in the newer Kirkcaldy suburbs. Most of the power-loom works built in the eighteen-sixties in Pathhead and Sinclairtown took up damask working in addition to weaving medium quality cloths.[12] This did not happen, however, in the older industrial areas of Kirkcaldy. Here traditional habits of workmanship and management preserved unchanged the character of textile production. Thus the distinction emerged in the latter part of the nineteenth century between the older textile working areas of Kirkcaldy (including Linktown), where the weaving tradition remained true to its early preoccupation with medium and heavier quality goods, and the newer industrial suburbs of greater Kirkcaldy where a younger industry had more diverse practices.

Much of the expansion of damask production in Dunfermline and elsewhere in the nineteenth century fed a growing export of high quality cloth directed, in common with most higher priced manufactures, to the more developed and developing parts of the world. Of outstanding importance was the growth of a large traffic with the United States. By 1869 the annual value of Dunfermline's manufactures was about a million pounds, of which half represented exports to American markets, a proportion which had been constant for thirty years or more.[13] Kirkcaldy's linen manufactures were worth much less than Dunfermline's, and only about a sixth of her production went to America. Serving a wider distribution of markets, catering more for the utilities rather than the luxuries of household and institution, the textile industry of Kirkcaldy was more broadly based than that of Dunfermline, its productions generally less spectacular and as a consequence less susceptible to change. Following the passing of the McKinley tariffs in 1890 the damask industry found itself especially vulnerable in the closing years of last century as the great American markets began to contract; 1897 and 1898, for example, were referred to locally as " very unsatisfactory years, due to Republican tariff policies". Whereas Dunfermline's linen export to the United States in 1896 were valued at £301,557, in 1897 they had dropped to £213,935.[14] Such rapid and serious changes in trading prospects show clearly the susceptibility of the damask industry to a reduction in status through the collapse of important markets. Following this there was in this century the great impact of the interwar depression and the growth of various substitute fashions and cloths for table linens. These together administered the *coup de grâce* to the greater part of the linen damask industry in Dunfermline, and paved the way for the intrusion of cotton and silk, rayon and other artificial fibres. In Kirkcaldy the linen factories of the late nineteenth-century suburbs and Dysart relinquished damask working, developing more such medium and heavier quality manufactures as had survived unchanged in the older parts of Kirkcaldy.

Whereas in Dunfermline the threat to the textile industry in the last years of the nineteenth century was an external one posed by changing circumstances of trade, Kirkcaldy's industry was, some time before this, faced by the internal problem of having to compete with

the growth of linoleum manufacture. It has been suggested that the development of the linoleum industry in Kirkcaldy was a natural adaptation from the jute industry there [15]; but this is not true. No doubt jute has been represented since the eighteen-thirties, when James Aytoun at his Newtown Mills did much to pioneer jute spinning on flax-tow machinery, and these mills were later given over exclusively to jute spinning. This development, however, appears to have been unique in the town. Jute weaving too has never had more than a minor, supplementary significance. It was from floorcloth manufacture, in which flax canvas first served as backing, that the linoleum industry evolved, and not from local jute working. Beginning in 1847 with Michael Nairn's floorcloth factory at Pathhead, it was not, however, until the eighteen-sixties that the floorcloth industry became really important, expanding in the period of the great extension of power-weaving; and it was probably then, inspired by the contemporary rise of jute manufacture in nearby Dundee, that jute backings replaced the locally woven flax canvas hitherto used. Further expansion took place after 1876, when Walton's patent for linoleum manufacture expired, and there were considerable additions to the industrial fabric of the town, the industry absorbing much labour and capital. By the end of the nineteenth century, though there were three times as many people engaged in linen as in linoleum manufacture, the value of the products of both industries was about the same [16] and it is clear that linoleum and floorcloth working, whose beginnings had been so surely linked with local linen weaving, was competing with that industry for the position of staple of the town.

While consideration of the general character of production throws light on major differences which underlay the evolution of Kirkcaldy and Dunfermline as textile centres, it obscures their common responses to important technical advances that took place within the industry itself. It neither permits comparison to be made of the relative status of the various branches of which the industry is composed nor does it afford a firm basis for establishing the chronology of industrial growth which must precede any analysis of industrial localisation. For these reasons the chronological growth of the modern industry is outlined here for each of the major processes concerned.

Spinning: The first significant use of power for driving textile machinery took place about 1788-90 when a number of water-powered mills were built, as for example Kirkland Mill on the Leven and the mills at Kinghorn—a phase of development from which both Dunfermline and Kirkcaldy were excluded due to the absence of streams of adequate size. The earliest mills were for cotton, but flax spinning followed soon after. It was introduced into Kinghorn by James Aytoun in the seventeen-nineties, into a bleaching site at Brucefield in 1792, and early cotton mills were converted to flax spinning at the beginning of the nineteenth century. Taking place within the hinterlands of the towns, the construction of these mills throws light on urban status and interests in this period. Thus Kirkcaldy manufacturers owned mills at Kinghorn and Kennoway [17] and set up others at Prinlaws on the Leven; their interests were quite dispersed. Dun-

fermline, however, though there were a few mills along the Lyne, Baldridge and Tower burns, had less importance in stimulating the regional spinning industry.

Interesting though these developments are in suggesting differences in the regional status of the towns, of greater significance was the introduction of steam-powered industry with which the evolution of urban industrial patterns began. Starting in Dunfermline in 1806 with Rontree's mill in Knabbie Street, and with Hendry's mill in Kirkcaldy the following year, it was not, however, until the eighteen-twenties that any substantial growth of mills took place. By 1832 there were ten mills in the town of Kirkcaldy and six in Dunfermline[18] (Figs. 1 and 2). Thereafter, however, spinning in Dunfermline gave way before the more economical production of yarns from elsewhere. Probably the great growth of damask weaving contributed to this decline too, for the dry-spun yarns of the town mills were not suitable for fine weaves. Thus Chalmers in 1844 (four mills were defunct by this time) refers to manufacturers obtaining the finer yarns from Belfast, Leeds and Preston, rather than from local mills. By about 1872 spinning in Dunfermline had ceased.

In Kirkcaldy, however, flax spinning remained important until late in the nineteenth century, with seven mills in the town in the eighteen-sixties and two in Kinghorn possessing a total then of 16,538 spindles.[19] The growth of power-weaving during the prosperous years for linen manufacture when the American Civil War depressed cotton trading also stimulated local mill construction, but no new mills were built after 1865 (Fig. 1). About twenty years later the linen trade began to experience difficulties. Swan Brothers, the largest local employers of labour, collapsed and the five mills that they controlled ceased to function. By the end of the century flax spinning was clearly in decline. It is interesting that, compared with Dunfermline, it should have retained its significance for so long. The reasons are not hard to seek. Kirkcaldy's share in the flax import trade played an important part. Most of the flax and tow imports for southern Fife came through Kirkcaldy, their distribution—save for those imports brought in shipping owned by manufacturers themselves (e.g. Swan Bros.[20])—handled by merchants or agents in the town. Much of the activity of Kirkcaldy individuals in stimulating regional developments in early mill spinning can be attributed to the vigour of the commercial arrangements centred on the port; and the economy of establishing mills in relation to raw material imports goes far to explain the greater virility of urban flax spinning here compared with Dunfermline. Another reason, probably of equal importance, reflects on the character of textile working. Damask weaving depended on fine wet-spun yarns from elsewhere, while most of the medium and heavy weaves used dry-spun yarns, such as those made in the Kirkcaldy mills and in the east of Scotland generally.

WEAVING: The early organisation of weaving as of spinning reflected the regional status of township in that it embraced considerable country areas. A great deal of the early hand-weaving industry of Fife was organised and controlled by Dunfermline and Kirkcaldy

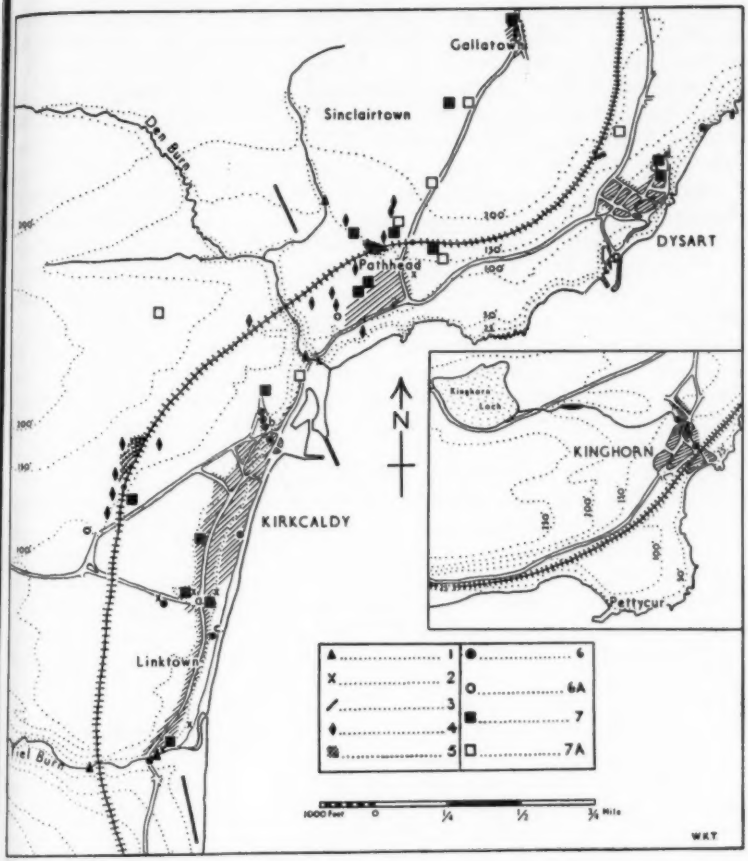


Fig. 1. The nineteenth-century growth of the textile industry in Kirkcaldy, Dysart and Kinghorn.

a. Nicoll Street Burn; *b.* Cauld Well Burn; *c.* Site of Bute Wynd Factory, later Macdonald's Mill. The distribution of linoleum works is that in 1956: note how much of it has evolved alongside the railway. Present-day coastline shown.

1. Bleachfield; 2. Dyework; 3. Ropework; 4. Linoleum factory; 5. Settlement, *c.* 1800; 6. Spinning mill, early nineteenth century; 6a. Spinning mill, 1864-65; 7. Power-loom weaving factory; 7a. Power-loom weaving factory built 1868-98.

merchants and manufacturers and the agents of both.[21] Both towns thus had a similar significance as centres of regional control, commanding the labour of considerable areas as well as themselves possessing the largest concentrated industrial populations of Fife. Against this background the introduction of power-weaving took place, at a time when urban mill spinning was acquiring its first importance and during a period when the possibilities offered by steam-power to the growth of industry were being clearly demonstrated for the first time.

The first power-loom factory was built at Bute Wynd in Kirkcaldy in 1821 (Fig. 1). It was the earliest successful one for linen weaving in Scotland, but low hand-weaving rates inhibited any immediate extension of power-weaving,[22] and indeed the Bute Wynd factory after a time was converted into a spinning mill. It was only when Normand built his works in Dysart in 1847, and Scott his in Dunfermline two years later, that power-weaving began to assume any importance; it was not until the eighteen-sixties that there occurred any considerable growth of factories similar in scale to the growth of mills in the eighteen-twenties. Fourteen power-loom works were built in the Kirkcaldy area in the period 1857-68, eight in Dunfermline between 1860 and 1876, and a good many in both towns were considerably extended at various times up to the end of the century [23] (Figs. 1 and 2). This expansion of power-weaving marked the climax of the growth of the textile industries of both towns. It has been shown that in Dunfermline this growth was unsupported by local spinning, the damask industry depending mainly on fine wet-spun Yorkshire, Irish or Continental yarns. In Kirkcaldy local spinning made a considerable contribution, but its decline latterly led to an increased dependence on yarn supplies from a variety of sources in the linen region and elsewhere. By the end of the century, both towns, and especially Dunfermline, were dominantly weaving centres, and, with the decline of hand-weaving that the power factory had caused, the contraction of regional industry, initiated by the introduction of mill spinning a century before, was virtually complete.

Bleaching: Whereas the application of power to spinning and weaving resulted in a progressive contraction in the distribution of industry, contemporary developments in bleaching witnessed an increasing dispersal. In this the search for adequate supplies of water for processing played an important part in a period when the mounting production of yarn and cloth led to a corresponding expansion of bleaching services. Apart from a short-lived cloth bleachfield built in Dunfermline in 1732,[24] local developments subsequently were concerned with the bleaching of yarns. This had greater importance for Kirkcaldy than for Dunfermline, because of the differing nature of textile production. A reference occurs in 1745 to the "stapple checks and tykes (of Kirkcaldy), in both of which a Great part of the yarn was whitened before it can be woven" [25]; and by the end of that century three-quarters of the yarn woven in the town was whitened. The growth of mill spinning in particular stimulated yarn bleaching, and a number of bleachfields emerged in southern Fife, the most substantial developments taking place in relation to the soft water supplies of the Leven-Ore-Lochty river system, many of them, as in the case of the early water-powered mills, contributed by Kirkcaldy individuals.[26] Ten fields eventually emerged along these streams, five of them in the middle of the nineteenth century belonging to merchants and manufacturers of Kirkcaldy burgh.[27] Nearer to the towns there were similar but more closely integrated developments along small streams such as the Tiel and East Burns of Kirkcaldy and the Lyne Burn of Dunfermline. Bleachfields such as these derived their yarns not only from

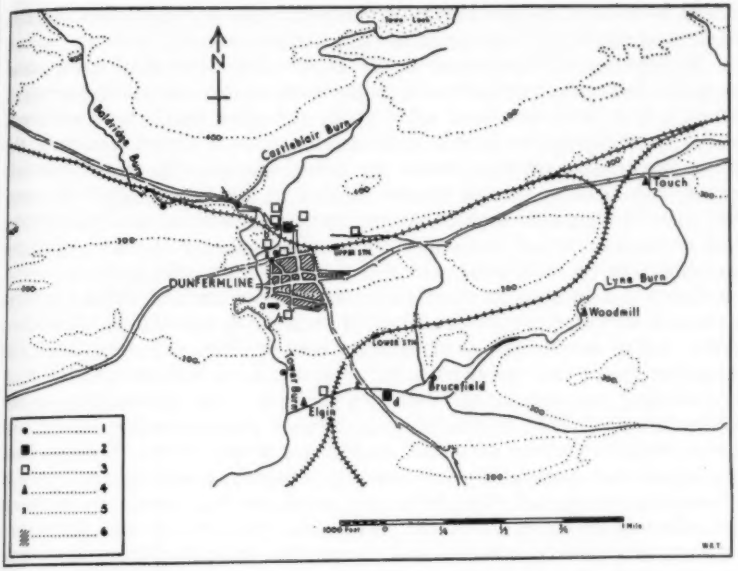


Fig. 2. The nineteenth-century growth of the textile industry in Dunfermline.

a. Site of Dunfermline Abbey ; *b.* Site of old Town Dam ; *c.* Site of Scott's Foundry Street Factory ; *d.* St Leonard's Factory.

1. Spinning mill, early nineteenth century ; 2. Power-loom weaving factory built before 1860 ; 3. Power-loom weaving factory built before 1860-76 ; 4. Bleachfield ; 5. Dyework, nineteenth century ; 6. Settlement, *c.* 1800.

regional sources but from a variety of places elsewhere, notably from the Continent. Through providing yarns for dyeworks or factory they thus developed as important centres of organisation in the textile industry.

The demands posed by the industries of Kirkcaldy and Dunfermline on the provision of bleaching services differed. Kirkcaldy manufacturers depended mostly on bleached yarns; the fine damasks of Dunfermline, on the other hand, were bleached in the piece. Thus, while Kirkcaldy industrialists played a notable part in stimulating yarn bleaching in southern Fife, those of Dunfermline, handicapped by the local lack of suitably soft, pure water supplies, depended primarily on bleaching services provided by places elsewhere. Some cloth bleaching developed latterly along the Leven, Dunfermline cloth was sent also to a bleachfield on the Devon, but the major dependence was on the famous fields of the Tay and Almond, near Perth. In Dunfermline itself the hardness and impurity of the local water prevented any significant development taking place. Thus Mercer refers to the impurity of the lade that served the old Town Bleachfield ; and along the Lyne Burn the yarn bleaching depended on water artificially softened before use. The character and beauty of fine linens depends a great deal on skilled bleaching techniques using suitably pure soft water supplies. It was for this reason that the bulk of Dunfermline's

linens were sent to the Perth bleachfields, whose reputation for fine bleaching was largely made in the nineteenth century.

By the end of the period under review the decline of urban and regional flax spinning had reduced the scale of local bleaching services. Only a few fields survived after 1900, the most important survivals being those along the Leven and its tributaries. There was here the most favourable physical basis for bleaching in Fife until the late nineteenth-century spread of coal mining to the Lochty and Ore, and the growth of paper-making along the Leven—forms of competitive industrial use which conspired with the regional decline of linen manufacture to reduce the status of the bleaching industry.

Dyeing : Dyeing contrasts in its distribution with bleaching in that it was a service principally confined to the towns. In Dunfermline were a few nineteenth-century dyeworks [28] (Fig. 2), but, like the spinning mills, they seem to have been ancillary features rather than a principal support for the weaving industry. In Kirkcaldy, on the other hand, dyeing acquired considerable regional status, and the town became the major centre in Fife for dyed yarns. Dyeing thus developed as a complementary activity to the local and regional growth of mill spinning and yarn bleaching, and for this reason its greatest growth took place in the early nineteenth century. It was then that commercial dyeing, as distinct from the private dyeing formerly practised by manufacturers on their own account, first became important.

Much of Kirkcaldy's reputation as a dyeing centre was acquired for its striped cloths. In these the chief colour used was indigo blue. Indigo mills powered by wind or horse were common in the eighteenth-century town, and indigo dyeing remained the main feature of the industry until late in the nineteenth century. But Bryson in the eighteen-seventies suggests that dyeing was lagging behind the other branches of Kirkcaldy's linen industry. With the twentieth-century development of synthetic dyestuffs its importance diminished further. In 1880 Von Bayer had produced the first synthetic indigo, and it began to be marketed in the last years of the nineteenth century by German chemists. This, together with the contemporary decline of local spinning, led to a contraction of the dyeing industry, a development, however, which only slightly affected the numbers locally engaged in textile working. Like the bleachfields the dyeworks possessed a wealth of commercial contacts, but, bearing in mind their turnover of work and capital, they were small employers of labour. In fact, there were only twenty-five people engaged in the seven Kirkcaldy dyeworks that existed in the eighteen-seventies (Fig. 1).[29] Though their activities were important in increasing the status of Kirkcaldy as a textile centre, their contribution to the physical growth of the town was clearly small.

In the period here considered it was the divergent tradition of their textile industries which contributed a great deal to the functional distinctiveness of Kirkcaldy and Dunfermline. It remains to consider the manner in which the morphology of these towns may have been influenced by the industries which inspired so much of their modern

growth. This directs attention to the precise location of the units of the urban textile industry. It does not include bleachfields as these were peripheral in their distribution, nor does it stress the significance of dyeworks as these were small employers of labour; its main concern is with mill and factory.

The establishment of large-scale units of power industry inspired the major growth of township in the nineteenth century. What is of interest to the geographer is whether these works show in their siting any clearly recognisable and recurring association with select landscape features. Granted the prior existence of a nucleus of labour in the hand-weaving suburbs of the town, of a communication network and of capital for investment, can one then detect in the particular circumstances of industrial growth any correlation with natural features? If there exists a recurring pattern, clearly it is not accidental. This does not mean that because of certain favouring features of environment industrial growth necessarily took place precisely where it did; but it does mean that in many instances choice of site for industrial development did involve some kind of assessment of landscape itself.

It is this sort of relationship which can be detected when one examines the distribution of mills and factories in terms of the easy availability of water for steam-raising. Where industry selects for its use local sources of water supply, and where it is sufficiently large-scale to attract population to it, then it is clear that there exists an indirect relationship between town growth and natural features of environment or prior elements of town use which cannot be ignored. The distribution of the textile industry in Dunfermline illustrates the point fairly clearly (Fig. 2). Three mills and six factories evolved along or close by a small lade which conducted water from Castleblair Burn and the Town Loch to the old corn mills by the Abbey; two works were along Lyne Burn, one along Baldridge Burn, and one along a burn which once flowed in line with Gardener's Street. Only Victoria Works (the last to be built) was not along stream or lade; it was sited at the bottom of the depression that flanked the northern edge of the early town, where water for its cooling ponds was available at small depth. Nearly all these works were built on fairly level ground to the north and south of the town nucleus, inspiring much urban growth over the steep slopes between. It was the contribution made by these units of the textile industry, together with the growth of those hand-weaving suburbs which first carried settlement west of the gorge of Pittencrieff Glen in the late eighteenth century, which inspired the compact, roughly concentric spread of Dunfermline outwards from the old Abbey site.

In Kirkcaldy, however, industrial and urban growth was far more complex. Though the great extension of the town has been clearly dominated by the coastal route, this fact is not in itself a sufficient explanation of why Kirkcaldy won its soubriquet of Scotland's 'Lang Toun' (Pl. 2). The siting and sequence of industrial growth has also to be considered. Some features suggest immediate comparison with those noted in Dunfermline, thus a dyeworks at Denburn, a mill and dyeworks along the Tiel Burn. But elsewhere mills, factories and

dyeworks appear quite dispersed (Fig. 1). The manner of dispersal, however, is interesting. Kirkcaldy and Linktown had evolved along the lower terraces of the Forth. These, firmly guiding urban extension lengthwise along the coast, were notched here and there by small streams, such as that known latterly as George Burn. Also, springs broke out at the foot of the terraces ; and, in addition, there was water to be had at small depth, held within the clay bed that underlies the town and which attracted the potteries of the late eighteenth and nineteenth centuries. In the absence of any clear line of attraction one had, therefore, mills and factories adopting sites that were quite scattered and dispersed, and yet in a number of instances showing in their siting an awareness of the problem of water availability. Nine mills, six factories and five dyeworks were built in association either with the spring lines of the 25- and 50-foot terraces or the small streams that notched them, the most notable of these being the burns that flowed down Nicol Street and Cauld Well Wynd (Fig. 1). Three of the factories sited at the foot of terraces had, however, evolved from hand-weaving works and thus the precise correlation here is fortuitous.

Nevertheless it would be wrong to interpret the overall pattern of industrial growth solely or even principally in terms of original ease of water supply. When power-weaving seriously began it was the weaving suburbs of the old burgh, whose evolution as industrial settlements had proceeded vigorously for something like a century and a half before this, and where labour and merchanting control were already centred, that attracted the new factories. The north-eastern suburbs especially, where mill spinning had never been represented and which were exclusively weaving areas, witnessed a growth that was particularly intense. Of the forty-one linen manufacturers listed in Westwood's Directory for 1862, ten were in Linktown, seventeen in Pathhead-Sinclairtown-Gallatown, two in Dysart and twelve in Kirkcaldy proper. It was this industrial tradition that indicated the areas where factory growth might be expected to evolve ; and, whereas in the eighteenth century Linktown had been the great weaving suburb, in the nineteenth century it was the newly developing area from Pathhead to Gallatown that became the most important, and most of the power-loom factories were placed there. In this area, relatively high ground which climbs fairly steeply from the 100-foot terrace to over 250 feet, there were no terraces, spring lines or the possibility of shallow wells to guide the localisation of industry. The factories simply evolved here in relation to the labour supply of the suburbs; and there seems little doubt that those constructed in the eighteen-sixties exerted demands for water which contributed greatly to the water scarcity which finally led to the introduction of the Lothrie supply in 1868. Of Hawklymuir Works, Bryson wrote, " When Mr. McLaren first started these works (1867) he was put to a very considerable inconvenience for the want of a sufficient supply of water. Several attempts were made by him to get a supply in the vicinity of the works . . . but all to no purpose. However, with the introduction of the Lothrie water the much felt want was supplied ; and, we believe, in no district has this valuable water scheme proved a greater boon

than in this." For the five factories that were built here after the introduction of an adequate piped supply in 1868 such problems did not arise.

It was this substantial growth of power industry in the Pathhead-Sinclairtown-Gallatown area, enlarging greatly the significance of the former hand-weaving suburbs here, which led to the north-easterly extension of Kirkcaldy inland from the coast. Similar happenings stimulated further settlement about the former hand-weaving suburb of Linktown, whose extension along the coast road to West Bridge formed such a classic example of ribbon development in the eighteenth century. It was only with the construction in the late nineteenth century of linoleum works in relation to the developing east-coast rail route that one had any industrial stimulus for the further spread of the town inland (Fig. 1). The road linking the old weaving suburbs of the late eighteenth and early nineteenth centuries, and the later railway, clearly have provided two fundamental lines within the present town ; but it has been the detail of the industrial growth about them which has made their significance so apparent.

Emphasis has been laid upon the importance of easily available water supplies in attracting the siting of early power industry. Obviously such a dependence created problems for later industrial growth. In Kirkcaldy local springs, streams and shallow wells were not always enough to cope with the needs for industrial water as the works expanded. Supplement in some cases came from water that had accumulated in the wastes of old coal mines over which the town had spread in the nineteenth century ; in other cases from the Forth, using soda to neutralise the salt [30] ; in others again from deep wells (e.g. Bennochy Works used first a well 35 feet deep and subsequently a 200-foot bore [31]). Apart from the problems posed by the industrial expansion of early works, and the later growth of larger works whose water requirements were greater, other difficulties arose from the extreme hardness of the water used. This applied to both towns, where encrustation of pipes and boilers was a common feature. Besides, Dunfermline's Town Loch, supplying the lade to the town, dried up completely in seasons of drought. For these reasons, with a few notable exceptions in Kirkcaldy (e.g. Abden, Bennochy and West Bridge works), factories, mills and dyeworks adopted main water supplies when these were made available for the growing urban populations of the late nineteenth century. Such attractions for power industry as environment offered in the period of its first growth thus ceased to have significance. That it is possible, however, to trace in the distribution of industry today recurrent features of association which suggest the importance of early water supplies indicates the danger of attempting to analyse an existing pattern without reference to its mode of evolution.

This study is diverse because it has attempted to show some of the complexity of the actions and interactions involved when considering industrial growth in relation to environment and to the status, form, and character of urban centres. It has been shown that the localisation of early power industry in towns lacking the controlled water

supplies that later became an accepted feature was attracted to certain natural features or prior elements of urban use. That this was not invariable does not stultify the argument that where industry could easily attach itself to local water supplies then it generally did. It is not implied that there was any inflexibility of rule or uniformity of behaviour among the industrialists concerned. There is no absolute limit to human choice, nor to the variety of individual circumstances that mould it. But where, in the siting of industry, similar circumstances within a period suggest similar solutions to common problems, then the collective choices made by individual industrialists—composing thus the actual distribution of industry—clearly have considerable significance in that they demonstrate that like causes have produced like results.

It has also been shown that it is possible to chart a fairly exact chronology of industrial growth. With power industry this is indicated by the dating of works construction, of their expansion, and of re-equipment, in each case an immediate measure being provided of the extent of capital investment. Where such a chronology is established, it indicates clearly enough the phases of major expansion, not only of industrial growth, but of the town growth inspired by it. It is by referring to the prime units of industry in a town in this way that it is possible to demonstrate the role of industry as a mainspring to settlement expansion, rather than by simply considering as a whole an urban pattern made up variously of primary, secondary and adventitious elements. Clearly in the nineteenth century two vital phases can be determined, so far as these towns are concerned : first, that of the beginning of the century when mill spinning acquired its initial importance, not only for itself but also for the way it stimulated an expansion of hand-weaving ; second, that of the eighteen-sixties when the great spread of power-weaving enlarged the significance of old weaving suburbs and created new ones. It was this sequence which enables the major trends shown on the population curve for the period 1801-1901 to be interpreted (Fig. 3), and it is by considering which areas this sequence affected most that so much of the evolving morphology of township in the last century can be explained.

There is also the contribution this study makes to an understanding of the evolution of the textile industries of the towns. It has been shown that the industry in Kirkcaldy was much more diverse than that in Dunfermline. Kirkcaldy had more importance for yarn spinning, yarn bleaching and dyeing ; whereas Dunfermline's growth was essentially that of a weaving town concerned with highly specialised productions. This in turn affected regional status. The activity of Kirkcaldy individuals in stimulating the growth of rural mills and bleachfields, the development of its dyeing trade, and the character of its production made it more important than Dunfermline as a centre of industrial organisation in southern Fife. Contributing greatly to this was the tradition of commerce inspired by Kirkcaldy's share in the traffic of the Forth. By the middle of the nineteenth century it had become the greatest of the Fife ports. Most of the revenue of the harbour then came from flax imports, and the export of cloth by coaster

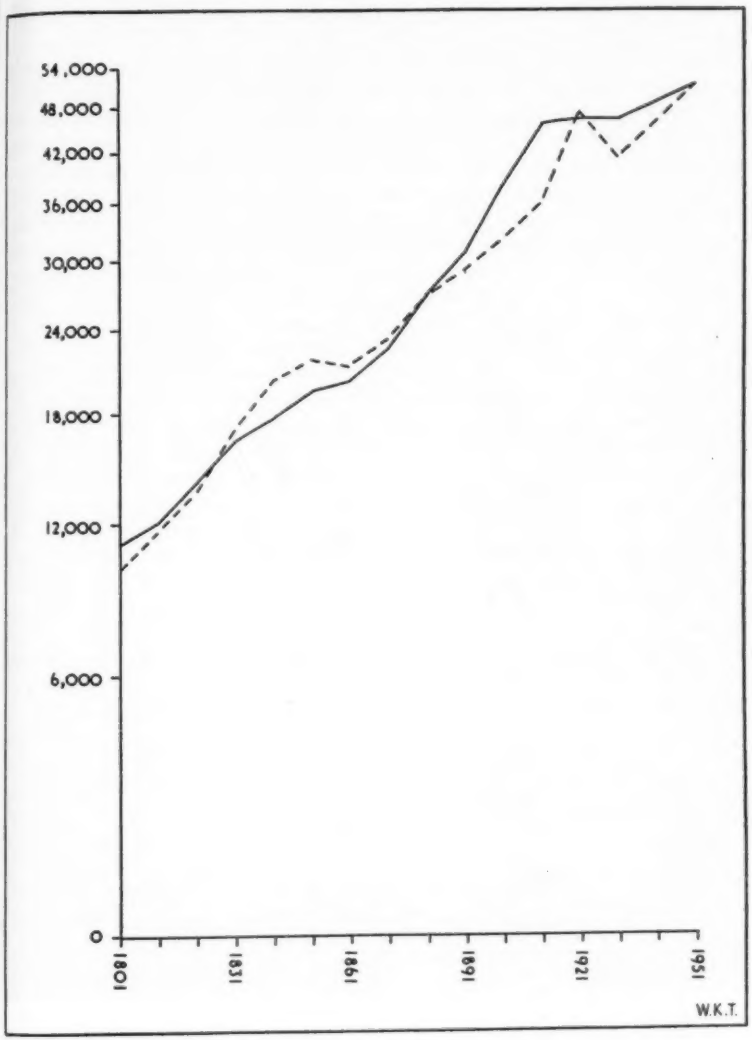


Fig. 3. Population changes in the civil parishes of Dunfermline (unbroken line), Kirkcaldy, Abbotshall and Dysart combined (dashed line).

Note : a. Logarithmic scale used for ordinate values ; *b.* the parishes of Kirkcaldy, Abbotshall, Dysart and part of Kinghorn were united in 1901 to form the parish of Kirkcaldy and Dysart ; *c.* The 1951 populations of the Municipal Burghs of Kirkcaldy and Dunfermline were 49,050 and 44,719 respectively.

gave decided economic advantages, particularly when regard is paid to the greater weight of Kirkcaldy linens compared with those of Dunfermline. It was this growth as a town with numerous com-

mercial contacts which fostered the greater diversity of its textile industry compared with that of its neighbour nearby.

Finally, there are the conclusions to be drawn from comparing the character of textile production, with which this study began. The divergence of Dunfermline from a regional tradition of textile workmanship to become a centre of highly specialised, fine damask production presents problems concerned with the migration of skills to which no completely satisfactory answer can be given. That there was already some specialisation in table linens before the activities of the Board of Trustees began has been shown, and it would seem reasonable to suppose it was a likely development for the Board to accept this as a firm basis for further encouragement. What is remarkable, however, is that Dunfermline and Kirkcaldy, towns only thirteen miles apart, should have continued to proceed on such independent lines. It was only when the late nineteenth-century spread of power-weaving made possible an easy extension of damask working that their textile traditions began to lose this quality of mutual exclusiveness. The adoption of damask working in addition to the normal Kirkcaldy productions in the newer Kirkcaldy suburbs points to the major reason for its absence in the older weaving areas. In Linktown and in the original burgh of Kirkcaldy the traditions of hand-craftmanship tied succeeding generations of textile workers and management to producing customary types of cloth on looms which differed from those of the damask workers of Dunfermline. It was only with the late nineteenth-century spread of power-weaving that these conditions were altered. That damask working did not subsequently intrude on the older industrial areas of Kirkcaldy may be ascribed to the contraction of the industry which economic trends at the close of the century foretold.

[1] Hamilton, H. *The Industrial Revolution in Scotland.* Oxford, 1932, pp. 78-79. Turner, W. H. K. Some Eighteenth century developments in the textile region of east central Scotland. *S.G.M.* 1953, 69 (1) : 10-22.

[2] Mercer, A. *History of Dunfermline.* Dunfermline, 1828, p. 163.

[3] *Ibid.*

[4] Barclay, G. Description of the Parish of Dunfermline, 1723—in Fernie, J. *A History of the Town and Parish of Dunfermline.* Dunfermline, 1815, p. 176.

[5] Chalmers, P. *Historical and Statistical Account of Dunfermline.* Vol I. Edinburgh, 1844, p. 354; Mercer, A. *op. cit.*, p. 143.

[6] *New Statistical Account.* Vol. 9, p. 753.

[7] *Old Statistical Account.* Vol. 18, p. 29.

[8] *Old Statistical Account.* Vol. 12, p. 511.

[9] Mercer, A. *op. cit.*, p. 165.

[10] *New Statistical Account.* Vol. 9, pp. 119, 157, 753.

[11] *Report from Assistant Hand-Loom Weavers' Commissioners.* 1839, p. 186; *New Statistical Account.* Vol. 9, p. 886.

[12] Based on details given in Bryson, J. *Industries of Kirkcaldy and District.* Kirkcaldy, 1872, pp. 77-82.

[13] *Assistant H.L. Weavers' Report, op. cit.*, p. 186; Mackay, A. J. G. *History of Fife and Kinross.* Edinburgh, 1896, pp. 215, 217.

[14] Clark. *Almanac for Dunfermline.* Dunfermline, 1900, pp. 7-8.

[15] Hamilton, H. *op. cit.*, p. 111.

[16] Mackay, A. J. G. *op. cit.*, p. 219.

[17] *Old Statistical Account.* Vol. 12, p. 239; Pigot & Co. *Directory for Scotland.* London, 1825.

Pl. 1. THE MUNGO PARK MEDAL

The Mungo Park Medal, instituted in 1930, is awarded by the Royal Scottish Geographical Society for notable services in the field of exploration.

These photographs show the new design, by Mr. C. d'O. Pilkington Jackson, R.A., for this medal. On the obverse is a new portrait of Mungo Park in moderate relief, on the reverse a new heraldic setting of the arms of the Society.

(actual size of medal 2″ diameter.)

Aerofilms

Pl. 2. KIRKCALDY

Looking south-west across the rolling surface of South Fife towards the Firth of Forth. The island—Inchcolm—and the two coastal hills are due to the presence of more resistant volcanic rocks in the weaker Carboniferous shales and sandstones. Kirkcaldy owes its modern importance and rapid growth to the presence of coal—some lying under the estuary—in these rocks. The old town—a harbour and fishing port—grew up along the narrow raised-beach terrace and was thus so constricted as to gain the nickname of the 'Lang Toun'. In the foreground (west of rocky promontory) are some linoleum factories.

[18] *Reports upon the Boundaries of the Several Cities, Burghs and Towns in Scotland.* 1832, p. 89; Chambers. *Gazetteer of Scotland.* Edinburgh, 1832, p. 658.
[19] Warden, A. J. *The Linen Trade—Ancient and Modern.* London, 1864, p. 147.
[20] Kirkcaldy Harbour Records 1832-34. (Manuscript.)
[21] *Old Statistical Account.* Vol. 18, pp. 29-30; Vol. 1, p. 459; Vol. 2, p. 534; Vol. 4, p. 502; Chalmers, P. *op. cit.*, p. 375.
[22] *New Statistical Account.* Vol. 9, p. 157.
[23] Clark. *op. cit.*, p. 23.
[24] Henderson, E. *Annals of Dunfermline.* Glasgow, 1879, pp. 423, 426, 441, 473.
[25] Records of the Board of Trustees for Fisheries, Manufactures and Improvements in Scotland. Letter Books (Manuscript), Vol. 3, p. 5.
[26] Records of the Board of Trustees. Minutes. Vol. 26, p. 276.
[27] *New Statistical Account.* Vol. 9, p. 470.
[28] See O.S. 6-inch to 1 mile plans, 1854; Chalmers, P. *op. cit.*, p. 385.
[29] Bryson, J. *op. cit.*, p. 57.
[30] See letter quoted in Livingstone, P. K. *Flax and Linen in Fife.* Kirkcaldy, 1951, p. 34.
[31] Compare Elgin Bleachfield, Dunfermline, with bores of 372 and 572 feet, both sunk in 1892.

The author wishes to express his thanks to the various textile firms in Dunfermline and Kirkcaldy who have helped him in his enquiries.

CONTRIBUTORS TO S.G.M., Vol. 73, No. 3, December 1957

J. E. Durno, Macaulay Ipstitute for Soil Research, Aberdeen.

Preston E. James, Professor of Geography, Syracuse University, New York.

Donald G. Moir, Hon. Secretary, Royal Scottish Geographical Society.

Anne Prentice, Research Student, Department of Geography, Glasgow University.

W. H. K. Turner, Department of Geography, Queen's College, St. Andrew's University, Dundee.

J. B. Caird, Department of Geography, Glasgow University.

GEOGRAPHY APPOINTMENTS IN SCOTTISH UNIVERSITIES, 1957

Glasgow:

Lecturer: Mr J. B. Caird, M.A., D. de L'UNIV., formerly Assistant.
Dr R. Common, formerly lecturer, has taken up the post of Assistant Professor in the University of Alberta, Edmonton.

Aberdeen:

Lecturer: Mr Roy Mellor, B.A., F.R.G.S., formerly of the Extra-Mural Department, Aberdeen University.

Edinburgh:

Lecturer (temporary): Mr R. A. Pullan, B.A., M.SC., formerly of Birmingham University, is taking the place of Dr J. B. Sisson, who is on a year's leave of absence to lecture in McGill University, Montreal.

LIVESTOCK AND FORAGE PRODUCTION IN CENTRAL MACEDONIA

ANNE PRENTICE

EXCLUDING poultry, there were, in 1953, over fifteen million animals in Greece ; or almost two per person. Nevertheless, there is a general shortage of livestock products in the country. Not only is there an insufficiency of livestock products but there is also a lack of balance in the country's agricultural development. First wheat and then cash crops have been encouraged, while the condition of livestock and forage production has been neglected. Animals are necessary in the mixed farming economy that is dominant in Mediterranean countries. Yet their vital role in the maintenance of soil fertility is not fully appreciated by Greek farmers.

In general, the shortage of animal products is due not to lack of numbers of livestock but to the poor quality and low productivity of the animals, in turn the result of shortage of food and inefficient care. Shortage of animal food is a basic factor arising from climatic conditions of summer drought which limits the length of the growing season for the herbage, and from depletion of existing natural sources of fodder by mismanagement and overgrazing. In consequence soil erosion of steep slopes denuded of their vegetation cover has caused damage both in the mountains and in the lowlands where flooding, river debris and silt threaten arable land.

This article is concerned with the combined problem presented by livestock and animal fodder production in a sample area, the Salonika plain of Central Macedonia. The Salonika plain proper, an area of about 500 square miles, is a mountain-girt seaward-facing basin below 200 metres (*c.* 656 feet). Composed of alluvial deposits, the older Tertiary and Quarternary material is distinguished as terraces that long ago bordered a previous extension of the Gulf of Salonika, while the more recent deposits include drained lake depressions, coastal flats and river deltas. The plain is crossed by the lower courses of three important Greek rivers, the Axios (Vardar), Aliakmon and Gallikos, and a number of smaller but permanent rivers drain inwards from the high ground to the west of the plain (Fig. 1).

Climatically Central Macedonia is transitional between the East European and the Mediterranean types. The former, dominant in winter (November to March) brings cold rather dry weather, interrupted at times by cyclonic depressions with high wind and rain brought south across the Balkans by a northward movement of the Mediterranean low pressure zone. Thus in January the mean temperature is 41·5° F.—on the borderline of minimum temperature conditions necessary for plant growth. Only in some years does snow fall in Salonika but frost must be expected until mid-March. In contrast, the summer is very hot, with a mean July temperature of 82° F., while spring and autumn are short and unsettled seasons. The average

rainfall, increasing from 19 inches in Salonika to 26 inches on the west margin of the plain, has a seasonal rhythm with rain in winter and one or more almost rainless months between June and September.

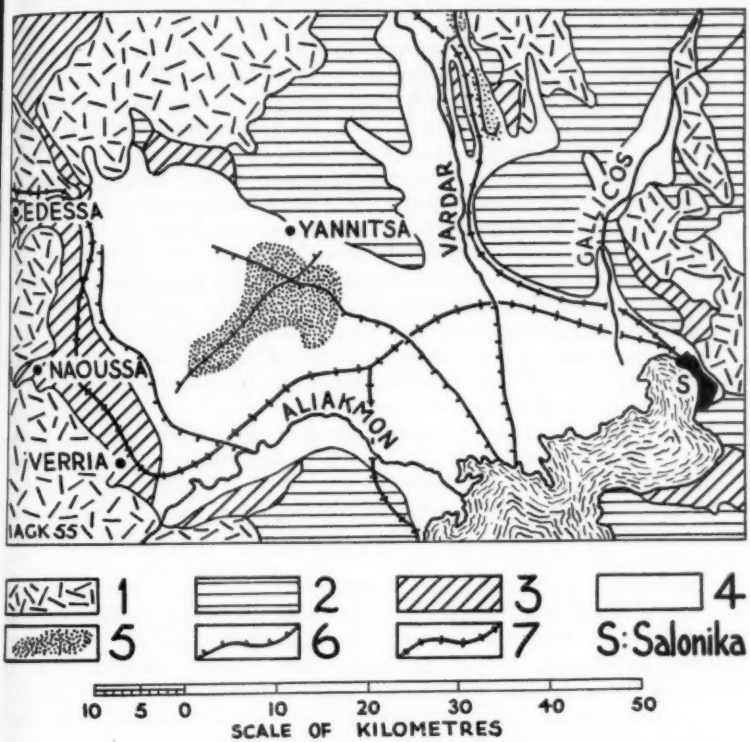


Fig. 1. Simplified diagram of geology and physiography of the Salonika Plain.
1. Crystalline and older sedimentary rocks forming upland or highland areas ; 2. Younger Tertiary deposits forming low, dissected plateaux ; 3. Quaternary deposits forming terraces or piedmont fans ; 4. Recent deposits forming deltaic plain of low relief ; 5. Former lake site ; 6. Main artificial drainage channels ; 7. Railway.

The natural vegetation includes deep-rooted trees, xerophytic shrubs adapted to withstand the summer drought, and quick-growing annual grasses and herbs. Plant growth is stimulated by the rise in temperature during March and continues rapidly under favourable temperature and rainfall conditions during April and May. By the end of May, however, a decrease in rainfall and the onset of the hot weather causes seed to set in the annual plants. The coincidence of high summer temperatures and small rainfall from June until September withers the grasses and herbs, and they lie dormant until an appreciable increase in rainfall during October promotes renewed energetic growth for a brief period. By December low temperatures again bring plant growth to a standstill.

The climatic climax vegetation on the dry plain—that is, around the margins of the lake depressions and on the foothill slopes—was formerly deciduous forest, probably mainly elm, judging from the few remaining small stands preserved around some villages or shrines. In the north-west of the area on the piedmont slopes at 250 metres (*c.* 800 feet) are some fossil stumps and tree sections which, lying on treeless pasture, indicate a previous cover of trees well over 100 feet tall. Clearing of land for agriculture, cuttings for animal fodder and fuel, and uncontrolled grazing of stock, have combined to remove the tree cover. The present natural vegetation, a bush-grassland association, is a biotic climax now largely confined to the marginal slopes surrounding the plain. On the western foothills deciduous bush eight to ten feet high, composed mainly of oak (*Quercus pubescens*) and hornbeam (*Carpinus duiensis*), border the streams. Elsewhere *pseudomacchia*, four to eight feet high, is more general. The latter association contains deciduous oak, kermes oak (*Quercus coccifera*) and juniper (*Juniperus oxycedrus*) as the dominant species. Eastwards, with decreasing rainfall, the bush vegetation degenerates to sparse scrub, one to two feet high, described by Ogilvie as *phrygana*.[1] Dominant annual grasses and herbs include species of *Medicago* with various *Trifolia* and other *Leguminosae*,[2] which are also found on the uncultivated village pastures of the plain proper. South of the Salonika-Verria railway on the extensive reclaimed marshlands, the vegetation is mainly tough salt-resistant annual herbs, with local patches of rushes (*Juncus spp.*). The coastal flats, now reduced to a strip two to five miles wide, carry a fairly dense cover of woody plants.

Agriculture in Macedonia, as opposed to simple cultivation, did not really begin until after 1913, the date when North Greece was liberated from the rule of a decadent Turkish Empire. In 1920, Ogilvie, publishing his observations made during World War I, describes the Salonika plain as an area of intermittent agriculture.[1] On the dry terraces and foothill margins patches of arable land were scattered among tracts of fallow and permanent pasture, meanwhile the centre and southern part of the basin was mainly lake and marsh, the latter supporting summer flocks and herds from the mountains of Greater Macedonia. During the past forty years methods of agriculture have been considerably improved, mainly by the introduction of more efficient implements, machinery, and new crops to supplement the limited range of cereals previously cultivated. On the plain, though not in all parts of Greece, the wasteful practice of fallowing cereal land in alternate years to maintain soil fertility has been discontinued, and although there is only local evidence of organised crop rotation, there has been an appreciable increase in yields per unit. Wheat yields for the whole country average 17·8 bushels per acre[3] and a further increase can be expected as farming techniques continue to improve. The prime need now is for more chemical fertilisers, particularly nitrogen and phosphorus.

The farm structure is based on small owner-worked holdings varying in size from five to fifteen acres (Fig. 2). Within each holding plots average only a half to three-quarters of an acre and, to com-

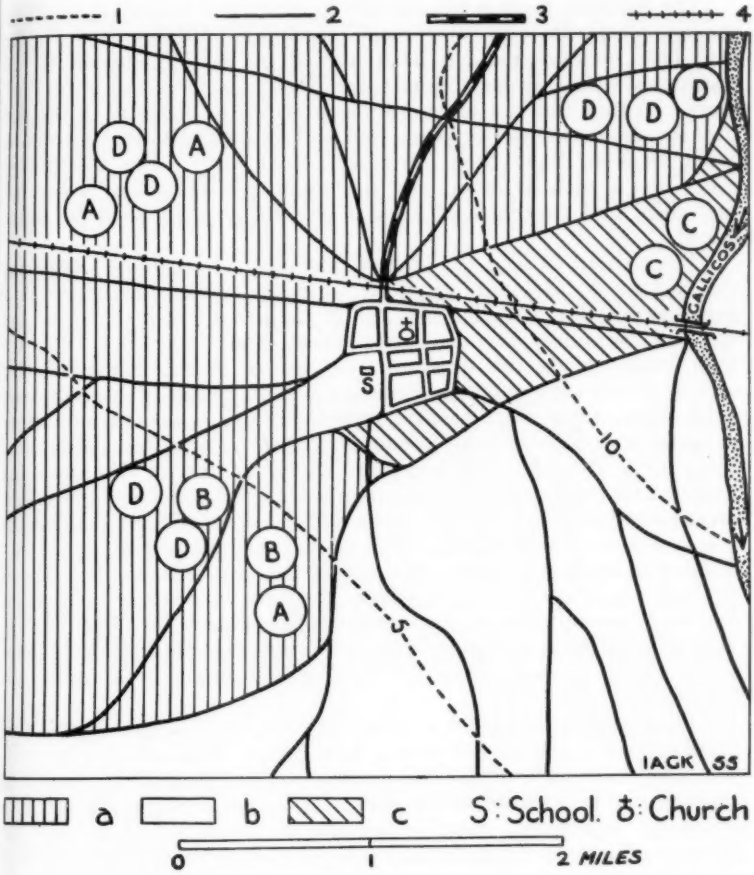


Fig. 2. A typical village and its land (based on a sample west of the Gallicos River).
1. Contours in metres ; 2. Unsurfaced track ; 3. Road used by country bus and leading to surfaced trunk road ; 4. Single track railway ;
AGRICULTURAL USE OF THE VILLAGE LAND (diagrammatic) : *a*. Extensive cropland ; *b*. Communal grazing ground ; *c*. Fruit and vegetables, intensive cropland ;
AGRICULTURAL USE OF PLOTS BELONGING TO AN INDIVIDUAL : *A*. Wheat ; *B*. Fodder crops ; *C*. Fruit and vegetables ; *D*. Cotton.

pensate for local differences in soil fertility, may be widely scattered. It is primarily a self-sufficient economy and the farmer grows a number of different crops and rears various animals for milk, meat, wool, transport and draught power. When not in use the animals are daily collected by the village shepherd and taken to pasture on the communal grazing grounds. These grazing grounds, however, cannot supply sufficient animal food all the year round and supplementary fodder is given to the animals according to their value to the farmer.[4]

The Salonika plain is climatically suitable for a variety of Mediterranean, temperate and subtropical crops, but until recent years the field crop combination has been limited by age-old custom to the traditional wheat, maize, fodder crops (barley, oats, rye and beans) and vines. Cotton and rice have only been grown in quantity in the district for about twenty-five years, and such crops as alfalfa, trefoils and grain sorghum have been introduced since 1957. For the future, other crops, such as hemp and sunflower, providing raw industrial materials, and concentrated animal foodstuffs, might well be introduced.

The pattern of land use (Fig. 3) includes nine regions. Region 1, the reclaimed lakelands, generally supports cotton and wheat in a two-year rotation. Region 2 is still in the process of being dried out but will eventually become cotton-wheat land. Region 3 lacks the high fertility of the two previous areas, but it lies within the irrigable area and cash cropping is increasing. Region 4, that of discontinuous cultivation among saline pasture, represents land in a transitional stage between a purely pastoral economy and one of arable cultivation. Region 5 is still saline pasturage but it will, in time, be dried out and irrigated for cultivation. Region 6 includes three districts of specialised orchard and vegetable culture, and on the outskirts of Salonika, Region 7 is another specialised region of market gardening and dairy production developed to meet the needs of the city. Region 8 is one of general mixed agriculture in which a variety of crops are cultivated and animals tended primarily to maintain the farmer's family. Finally, Region 9, the hill grazing, is no less important than the cultivated plain and requires as much in the way of good husbandry as the arable land does.

The livestock exist as far as possible on the natural and semi-natural vegetation with additional feeding from fodder crops where necessary. The three main types of grazing grounds are the hill pasture, the saline pasture, and the pastures in the plains. The first, composed of a shrub-grassland association, more or less dense, supplies grazing and cut fodder in the form of branches, and the bush element is also a source of fuel. Secondly, the saline flats behind the coast provide permanent grazing, valuable in summer because they remain moist. Half a century ago these saline pastures covered a much greater area, carrying not only local animals but also, in summer, huge flocks from the mountains of Greater Macedonia. After 1920, when land reclamation began, the marshes were drained, and in places ploughed under. To-day it is estimated that about half the area of reclaimed marsh remains as pasture, now dry, where in summer white salt encrustations minimise the already low grazing value. The summer herds no longer come to the Salonika plain, and only a few temporary shepherds' shelters stand on the coastal pastures—anomalous beside the modern agricultural machinery working to diminish further the moist grazing land. Thirdly, the pasture in the plains, in contrast to the above types of extensive pasture land, consists of small local patches of grassland essential under the present agricultural economy to villages without access to hill or coastal pastures. The plains pastures have the lowest

productivity of the three groups; the short sward is often full of thistles and even discontinuous showing areas of naked soil and provides only a short season of grazing from March until the end of June. Because they are communally owned, there is little feeling of responsibility among the farmers to improve the pastures. Where possible such pasture is located on ground unsuitable for cultivation—along the valleys of the main rivers where seasonal flooding may occur, or on local patches of less fertile soil—but too often the pasture in the plain is little more than waste ground in direct competition with arable land, but by tradition, exempt from the plough. All this is free grazing and farmers assume their rights to use and misuse it. However, in a winter rainfall climate the pastures are only productive from November until May, and even then the nutritive value of their grazing is low.

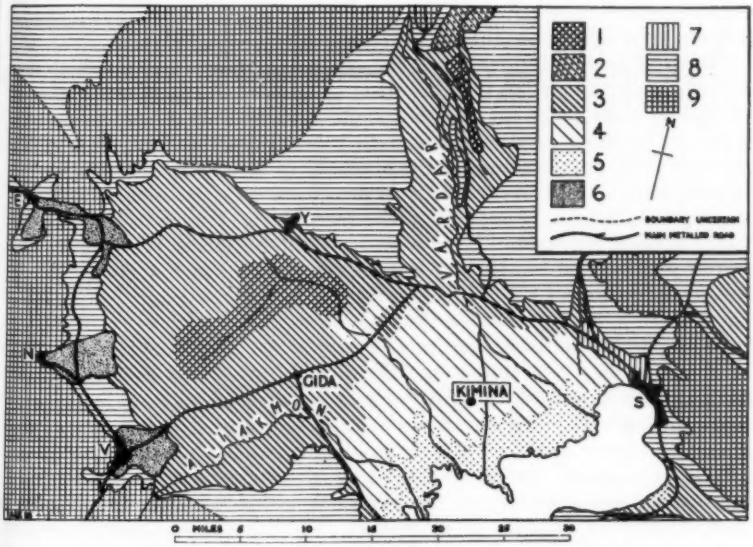


Fig. 3. Generalised map of agriculture on the Salonika Plain.

1. Wheat/Cotton lakelands; 2. Partially cropped because of incomplete reclamation; 3. Mixed farming with cash crops important; 4. Discontinuous cultivation among saline pasture; 5. Saline pastures; 6. Orchard and vegetable culture; 7. Dairying and market gardening; 8. General mixed agriculture with cash cropping and irrigation restricted; 9. Hill grazing (sheep and goat) with intermittent and localised cropping.

The cultivated fodder crops include maize, broad beans, and the cereals, oats, barley and rye, sown separately or in combination with beans, and in recent years, vetch. In general, the method of cultivation for cereals is to sow in November, possibly take a green cutting in late March or early April, and then leave them to ripen before cutting in early June. Only a small proportion of the cereal crop is threshed, the bulk of it being treated as hay. Too often such crops are cut too late—after they have attained their maximum

nutritional value. Maize is generally a spring-sown crop harvested in July-August, but it may be a summer second crop planted after wheat on irrigated land. In addition, livestock are fed with crop by-products such as chaff, straw and maize stalks. At present silage is not made by the ordinary farmers but maize is recommended for ensilage.

Considering first the problems associated with the natural sources of fodder, the permanent pastures, it is obvious that maximum utilisation of the vegetation is detrimental to the land. Overstocking and continual use, particularly by goats which browse the shrubs, cause the more palatable species to die out. Subsequently, the hill pastures may be burned at too frequent intervals leaving an inadequate vegetation cover on steep slopes, and then severe soil erosion takes place, making more difficult the task of reafforestation. In another direction, too, the use of free range pastures means that much precious animal fertiliser is wasted on the hills. This is particularly important in a country where as much as 40 per cent of the available animal manure may be used as fuel because wood is scarce.

With regard to fodder crops the main factors are the insufficiency for current demands, and the fact that the principal cereal crops grown for fodder take from the soil the same nutrients as wheat does. In order to increase production and to raise the yields per unit under conditions of dry farming, it is necessary to lengthen the rotation to include two or more years under green forage crops such as legumes and vetches, which, if cut before the seed is set, replace in the soil the badly-needed nitrogen. The nature of the problem recognised, research was carried out during the period 1933-37 at the Forage Crop Research Station at Larissa. The Report of the Food and Agriculture Organisation in 1947 states that encouraging results were obtained from experiments with legumes, soya beans and lucerne as non-irrigated crops.[5] A practical difficulty, however, is that the farm holdings are too small for a farmer to spare part of his land for several years to a green forage crop such as alfalfa, but if some sort of co-operative system could be arranged, it is estimated that the consequent increase in cereal yields would more than compensate for loss of acreage. An experiment of this kind was initiated by H. Lee Landerman of the Economic Co-operation Administration, near Verria: 12·5 hectares were planted to alfalfa on behalf of 150 villagers each of whom harvested his own plot. As a result the fodder return was nearly four times greater than that from communal pastures.[6]

Meanwhile, as an intermediate stage, farmers are beginning to incorporate vetches with the fodder cereals. On the dry farmland of the Salonika plain the following rotation is recommended by B. M. Lansdale, Director of the American Farm School, Salonika.

1. Vetch and oats for hay *or* vetch for seed *or* horsebeans for seed *or* green peas.
2. Wheat.
3. Barley *or* oats.
4. In some cases a fourth year of cotton, maize or sesame is included.

In certain localities where tobacco is dominant, this cash crop is planted for five years out of six, and for the sixth year a rotation of a

leguminous crop, wheat or maize is recommended. Only in the irrigated fruit and vegetable districts on the west margin of the plain is alfalfa grown under the fruit trees. This crop is generally sold since the fruit farmers themselves possess few animals.

In Greece, the losses of livestock due to the Second World War have now been made good so that by 1955 numbers had reached pre-war levels. Yet, production of animal products still remains insufficient for the country's requirements. To-day, under more settled conditions, Greece must decide whether the number of poor-quality animals will continue to increase, or whether an effort will be made for better-quality beasts, even with a possible decrease in the total number of animals. First, however, it is necessary to give a brief description of the livestock situation with regard to the purpose of the animals and their comparative value both to the owner and to the country (Table 1).

	TOTAL [1] (THOUSANDS)	MILK : % OF TOTAL [2]	MEAT : % OF TOTAL [1]	ANNUAL COST OF UPKEEP [3]	ANNUAL PER CAPITA VALUE OF PRODUCE [3]
Sheep	8,254	45	35	£4	£4, 10s.
Goats	4,510	30	16	£5	£5
Cattle	904	20	12	£36	£42
Buffalo	72	5	..	..	..
Pigs	603	..	22	..	..
Poultry	..	..	15	..	..
Equines	..	..	..	Horse £65 Mule £47 Donkey £5	..

TABLE 1. CHART SHOWING RELATIVE VALUE OF ANIMALS IN GREECE 1953

Sources: 1. Based on data from Statistical Summary of Greece 1953.
2. Pre-War figures from Report of the F.A.O. Mission to Greece, 1947.
3. Estimations made at the American Farm School, Salonika, 1955.

Sheep are by far the most numerous, and by present standards probably the most valuable animals ; in 1953 they numbered eight-and-a-quarter million head. Reared primarily for milk, with meat and fleece of secondary importance, sheep have a lower cost maintenance than dairy cows. Nevertheless, sheep and cows are not necessarily in competition for the milk market since sheep's milk is largely used for the cheese industry and yaourt while cow's milk is generally marketed fresh. In the future, improvement in sheep should be directed towards increasing meat and wool production, meanwhile maintaining high milk yields. Goats numbered four-and-a-half million in 1953. Like sheep they are reared primarily for milk, making a smaller meat contribution, and their cost of maintenance is much the same as that of sheep. In view of the damage to the natural vegetation by such large quantities of browsing animals it is considered that the free ranging goat population might well be reduced.

Cattle total 904,000 of which about one-quarter are dairy cows, the rest being draught oxen. Cows are, however, fairly widely used

for draught power too ; in 1945 it was estimated that 50 per cent[7] of the milk cows were dual-purpose beasts. No doubt that figure has now been reduced as the country recovered from war damage done to livestock. Beef cattle are rare, though a few herds are reared on the saline coastal pastures to meet the exceptional market demand of the few cities of Greece. In general, if not required for draught, bullocks are slaughtered before they are one year old. On coastal lowland areas such as the Salonika plain buffalo are of considerable importance, supplying draught power and a little milk. The future programme for cattle and buffalo is expected to improve the milking capacity of cows and maintain good draught qualities in oxen. Of the draught animals cattle are the most important, but horses, donkeys and mules are also much used. Indispensable to the farmer, the draught animals receive preferential treatment and the lion's share of the supplementary fodder. Other animals include pigs and poultry, but these animals are regarded as scavengers and make little demand on the available animal food supply.

The farm complement of livestock on an average holding on the Salonika plain includes five to fifty sheep, one to three goats, one or two draught animals, some poultry, probably a pig, and perhaps one or two cows or buffalo. During the grazing season cattle, sheep and goats are generally pastured communally under the care of the village shepherd, though some goats may be tethered in the village and along the edges of roads and streams. The system of communal grazing is vitally important in the question of livestock improvement. Congregated on poor pasture, and huddled in muddy corrals whose reed fences give no protection against wind and rain, diseases and parasites spread easily among animals having a low resistance. Moreover, the farmers, realising that under such conditions any attempt at stock improvement is time wasted, are slow to co-operate in Government-initiated schemes. The system of communal grazing makes scientific inspection difficult and selective breeding almost impossible. In addition, the Veterinary Service is inadequate, and it was estimated that about 10 per cent of the sheep and goat population were lost annually through neglect.[8] The draught animals are the most healthy because, being in use by day, they are generally stall fed.

Near Salonika, in a belt extending from the outskirts of the city to the Gallikos river, conditions are rather different, and certain interesting features may be noticed. Farmers have five to fifteen cows, often of improved breed, a greater number of pigs and poultry, but rarely any sheep and goats ; the farm buildings include a solidly constructed animal steading ; and the animals graze in fenced fields. This district, the dairy zone of a large urban market (population 300,000) has benefited from its proximity to the city, and shows evidence of marked improvement in animal husbandry and breeding, and, more important, an appreciable increase in yields. It is estimated that cows in this area give three to four times as much milk as cows in rural Greece, and the output of eggs per hen is trebled.

In pre-war years the programme of animal improvement was begun, mainly by the importation of breeding stock to improve native

breeds. After the War the situation was again reviewed by the F.A.O. Mission to Greece in 1947. It was estimated that most of the improvement must come from better nutrition, better methods of husbandry and by selection and up-grading of native breeds rather than by cross breeding with animals unaccustomed to local conditions of climate and disease. In particular, investigations to define and grade indigenous breeds, together with research in cross breeding for the special improvement of milking capacity in cattle and fleece in sheep, were recommended and are being carried out now at Government research stations. It may be cited here that experiments in Egypt indicated that the best milk yields from healthy animals could be obtained from up-grading native cattle with good dairy stock from North-West Europe.

Under present conditions there are too many animals for the existing food supply. It is estimated that one-and-a-half to two million hectares in Greece are available as permanent grazing. On the basis of one hectare per goat, two million goats is the maximum number for the country ; but in 1953, in spite of war losses, Greece supported over four million goats.[8] Thinking in terms of sheer numbers in relation to the food supply, draught animals are probably the country's greatest burden. For the amount of hand feeding they receive they could, in many cases, do more work—if the land were available. As it is, each farmer is obliged to feed his own draught animal for his own small holding. Furthermore, because animal fodder is in short supply, farmers are forced to slaughter surplus young stock at an uneconomical age, long before they have reached maximum meat production. For example, lambs are too often slaughtered at the age of sixteen to twenty weeks when their carcases average only twenty pounds in weight.

With regard to animal feeding, it is obvious that the emphasis must shift from natural and semi-natural vegetation to cultivated forage crops. This problem, occurring in most of the Mediterranean countries, has concerned agriculturalists in recent years, and various recommendations have been made, and experiments undertaken. Broadly, to maintain soil fertility and at the same time increase yields it is strongly urged that legumes be grown in rotation (if possible for a period of several years) and that use be made of the grazing animal on arable land. J. P. Maule, lately Livestock Officer in Cyprus, suggests that sheep and goats should be kept, for part of the year anyway, in temporary folds on arable land growing grazing crops, thereby resting the natural vegetation and enriching the soil with animal fertiliser.[9] In practice, the cost of fencing, expensive in a country such as Greece where wood and metal are equally scarce, would present a disadvantage. Another recommendation made by Maule is that of tethering goats on arable land. Experiments in Cyprus proved that tethered goats yield three to five times as much milk as the free ranging goats. Other means for improvement include a larger Veterinary Service and close inspection of the animals, and also pilot farms and demonstration plots. In Syria, for example, demonstration plots occur at five-kilometre intervals along the main road between Homs and Hama, and farmers, passing daily, cannot

fail to see them. In addition, credit facilities for developing livestock, and even Government subsidies for land under forage crops, have been suggested.

The marketing of livestock and their products is still a fairly simple system, unorganised, and involving wastage between producer and consumer. In rural districts there is room for improvement, while in areas containing large towns the difficulties are acute.

Considering the rural districts first, livestock for meat are generally taken to slaughterhouses in the local town (population over 10,000) where conditions are too often unhygienic and wasteful. The milk industry is less centralised. Most of the cheese for the year must be made during the four-month period March-July when milk is plentiful, and preserved. The bulk of the cheese is soft white cheese, strongly salted and often stored in old petrol cans, though a small amount of hard yellow cheese, requiring manufacture in local cheese factories and cold storage, is made and preserved in the towns. Wool is sold to dealers in the towns for manufacture in small factories. Although many housewives still spin and weave their own cloth, the textile industry, stimulated by the recent emphasis on cotton production, is becoming more centralised. For these rural districts the essential improvements are for better conditions of slaughtering, and for more ample cold-storage accommodation to preserve such seasonal produce and maintain supply, both locally and to the urban markets, at steady prices throughout the year. Another need is for the establishment of local industries to utilise valuable animal by-products, at present often wasted.

In the neighbourhood of Athens, Salonika and other such large towns (population over 35,000) such as Kavalla and Volos, the arrangements and problems are rather different. There is the difficulty of supplying adequate fresh milk to meet the heavy demand, especially during the hot season. The retailers in the towns have little storage space on their premises and it is necessary for them to take in stock little and often. Such small frequent shipments are a burden on transport and entail much handling by a great number of middlemen. In the towns the great need is for central organisations to collect, store and distribute meat, cheese and eggs—possibly on a co-operative basis. The Report of the F.A.O. Mission to Greece in 1947 strongly urged the need for investigation into the standard of quality of livestock products.

It is clear that the present livestock and animal food situation is quite unsatisfactory. There are a large number of poor-quality animals existing under unhealthy conditions. Investigations have indicated that their well-being depends more on better nutrition and methods of husbandry than in breeding with imported stock. However, sources of animal food, both natural and cultivated, are inadequate for any such programme, and it will take many years to bring about the necessary increase in fodder crop production. As a first step farmers are beginning to include vetches with cereals, and in time irrigation will probably extend the area of green forage crops, especially in the Salonika dairy zone. Meanwhile, much of the pastures in the plain

must be regarded as little more than waste ground. Although trials, such as the cultivation of alfalfa near Verria, indicate that these pastures can be more productive, the tradition of common pasturage is a social and economic problem involved in the question of land tenure and size of holdings. Furthermore, any industrial progress in animal by-products for the manufacture of such goods as bone meal fertiliser must take its place in order of priority in the country's economic development.

In the meantime, certain steps have been suggested to improve the situation. Pastures could be freed for part of the year by enclosing animals in temporary folds on arable land to the benefit of natural vegetation, animals and cultivated land. The value of certain forage crops on unirrigated land has been ascertained and such crops need only to be effectively introduced to farmers. Many free range goats are a liability but smaller numbers of tethered goats are highly productive. Although livestock improvement should come from better management there is scope for further research into cross breeding for special purposes such as fresh milk production. Lastly, the Veterinary Service must be increased, and marketing arrangements controlled and integrated.

Thus the first part of the problem, the recognition of the task and much of the investigation, is well started. It remains to be put into practice. Perhaps co-operative systems, developing from basic communal organisation of the village, will help to solve the problem, or legislation may be necessary. Livestock and animal fodder crops are the weak link in the country's agricultural development, but at present it is not possible to do more than indicate the way in which Greece might improve the situation.

[1] Ogilvie, A. G. A Contribution to the Geography of Macedonia. *Geographical Journal*, 1920, 55 (1) : 1-34.

[2] Turrill, W. B. Contributions to the Flora of Macedonia. *Kew Gardens Bulletin*, 8 and 9, 1913. This gives a more detailed list of species composing the natural vegetation.

[3] *Statistical Summary of Greece.* Athens, 1954.

[4] Further details about village life are given in Common, R., and Prentice, A. Some Observations on the Lowland Macedonian Village. *Tijdschrift Voor Economische en Sociale Geografie*, 1956, 47 Ste (9).

[5] *Report of the Food and Agricultural Organisation Mission to Greece.* Washington, 1947.

[6] *Pasture and Fodder Development in Mediterranean Countries.* Organisation for European Economic Co-operation, Paris, 1951.

[7] United Nations Relief and Rehabilitation. *Operational Analysis Papers:* Agriculture and Food in Greece. London, January 1947.

[8] Stephanides, C. S. Sheep—Man's Best Friend in Greece. *Foreign Agriculture.* 1948, xii (7) : 153.

[9] Maule, J. P. Animal Husbandry in Relation to Land Use and Environment. *The Proceedings of a Conference on Land Use in a Mediterranean Environment.* Nicosia, 1946.

The author would like to express her gratitude to Mr B. M. Lansdale of the American Farm School, Salonika, to Mr J. P. Maule of the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh, to the Carnegie Trust for financial aid, and to Professors Miller and Gomme and Dr Common for advice and encouragement.

fail to see them. In addition, credit facilities for developing livestock, and even Government subsidies for land under forage crops, have been suggested.

The marketing of livestock and their products is still a fairly simple system, unorganised, and involving wastage between producer and consumer. In rural districts there is room for improvement, while in areas containing large towns the difficulties are acute.

Considering the rural districts first, livestock for meat are generally taken to slaughterhouses in the local town (population over 10,000) where conditions are too often unhygienic and wasteful. The milk industry is less centralised. Most of the cheese for the year must be made during the four-month period March-July when milk is plentiful, and preserved. The bulk of the cheese is soft white cheese, strongly salted and often stored in old petrol cans, though a small amount of hard yellow cheese, requiring manufacture in local cheese factories and cold storage, is made and preserved in the towns. Wool is sold to dealers in the towns for manufacture in small factories. Although many housewives still spin and weave their own cloth, the textile industry, stimulated by the recent emphasis on cotton production, is becoming more centralised. For these rural districts the essential improvements are for better conditions of slaughtering, and for more ample cold-storage accommodation to preserve such seasonal produce and maintain supply, both locally and to the urban markets, at steady prices throughout the year. Another need is for the establishment of local industries to utilise valuable animal by-products, at present often wasted.

In the neighbourhood of Athens, Salonika and other such large towns (population over 35,000) such as Kavalla and Volos, the arrangements and problems are rather different. There is the difficulty of supplying adequate fresh milk to meet the heavy demand, especially during the hot season. The retailers in the towns have little storage space on their premises and it is necessary for them to take in stock little and often. Such small frequent shipments are a burden on transport and entail much handling by a great number of middlemen. In the towns the great need is for central organisations to collect, store and distribute meat, cheese and eggs—possibly on a co-operative basis. The Report of the F.A.O. Mission to Greece in 1947 strongly urged the need for investigation into the standard of quality of livestock products.

It is clear that the present livestock and animal food situation is quite unsatisfactory. There are a large number of poor-quality animals existing under unhealthy conditions. Investigations have indicated that their well-being depends more on better nutrition and methods of husbandry than in breeding with imported stock. However, sources of animal food, both natural and cultivated, are inadequate for any such programme, and it will take many years to bring about the necessary increase in fodder crop production. As a first step farmers are beginning to include vetches with cereals, and in time irrigation will probably extend the area of green forage crops, especially in the Salonika dairy zone. Meanwhile, much of the pastures in the plain

must be regarded as little more than waste ground. Although trials, such as the cultivation of alfalfa near Verria, indicate that these pastures can be more productive, the tradition of common pasturage is a social and economic problem involved in the question of land tenure and size of holdings. Furthermore, any industrial progress in animal by-products for the manufacture of such goods as bone meal fertiliser must take its place in order of priority in the country's economic development.

In the meantime, certain steps have been suggested to improve the situation. Pastures could be freed for part of the year by enclosing animals in temporary folds on arable land to the benefit of natural vegetation, animals and cultivated land. The value of certain forage crops on unirrigated land has been ascertained and such crops need only to be effectively introduced to farmers. Many free range goats are a liability but smaller numbers of tethered goats are highly productive. Although livestock improvement should come from better management there is scope for further research into cross breeding for special purposes such as fresh milk production. Lastly, the Veterinary Service must be increased, and marketing arrangements controlled and integrated.

Thus the first part of the problem, the recognition of the task and much of the investigation, is well started. It remains to be put into practice. Perhaps co-operative systems, developing from basic communal organisation of the village, will help to solve the problem, or legislation may be necessary. Livestock and animal fodder crops are the weak link in the country's agricultural development, but at present it is not possible to do more than indicate the way in which Greece might improve the situation.

[1] Ogilvie, A. G. A Contribution to the Geography of Macedonia. *Geographical Journal*, 1920, 55 (1) : 1-34.

[2] Turrill, W. B. Contributions to the Flora of Macedonia. *Kew Gardens Bulletin*, 8 and 9, 1913. This gives a more detailed list of species composing the natural vegetation.

[3] *Statistical Summary of Greece.* Athens, 1954.

[4] Further details about village life are given in Common, R., and Prentice, A. Some Observations on the Lowland Macedonian Village. *Tijdschrift Voor Economische en Sociale Geografie*, 1956, 47 Ste (9).

[5] *Report of the Food and Agricultural Organisation Mission to Greece.* Washington, 1947.

[6] *Pasture and Fodder Development in Mediterranean Countries.* Organisation for European Economic Co-operation, Paris, 1951.

[7] United Nations Relief and Rehabilitation. *Operational Analysis Papers:* Agriculture and Food in Greece. London, January 1947.

[8] Stephanides, C. S. Sheep—Man's Best Friend in Greece. *Foreign Agriculture.* 1948, xii (7) : 153.

[9] Maule, J. P. Animal Husbandry in Relation to Land Use and Environment. *The Proceedings of a Conference on Land Use in a Mediterranean Environment.* Nicosia, 1946.

The author would like to express her gratitude to Mr B. M. Lansdale of the American Farm School, Salonika, to Mr J. P. Maule of the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh, to the Carnegie Trust for financial aid, and to Professors Miller and Gomme and Dr Common for advice and encouragement.

CHANGES IN THE GEOGRAPHY OF TRINIDAD

PRESTON E. JAMES

MOST of the predictions that geographers make lie safely buried in libraries. Unlike the laboratory scientists who can bring the processes they study down to observable size and period, the geographers must await the slow operation of real processes, modified by all the unsystematically associated features of particular places. The process in a specific context is the essence of geography. But not always do we have the opportunity to watch the outcome of a forecast and so to provide ourselves with a check on the reliability of our concepts.

The author had such an opportunity recently on the island of Trinidad in the British West Indies. In the summer of 1924 he made a hurried survey of the island, identified its major parts, described its physical character, and indicated how the processes of land use and settlement were bringing about changes. The results were published in a series of articles in *Economic Geography*,[1] in the *Scottish Geographical Magazine*,[2] and elsewhere.

The Physical Character. Along the northern coast there is a range of steep-sided mountains, some 3,000 feet in elevation. This range, an eastward continuation of the coastal mountains of north-eastern Venezuela, rises abruptly from a series of terraces along the Caribbean. On the southern side the dissecting streams have opened several pouch-shaped valleys. To the south two lower hilly belts cross the island, also more or less from east to west. Their rounded summits are only about 1,000 feet above sea level. In between there are dissected terrace lands, and low swampy plains.

The climate is equatorial. Temperatures are never excessively high and there is never any cold weather. The easterly trades are strong on the east-facing coast and are felt throughout the island except in the lee of protecting heights. Rainfall is heavy, with the greatest amount falling between June and December, but with no season that is really dry. The heaviest rainfall is of more than 150 inches on the eastern end of the Northern Range ; a belt of more than 100 inches extends southward a little back from the east coast. Each day convectional storms develop in this belt of over 100 inches and drift westwards. Rain comes in the form of heavy showers, separated by periods of brilliant sunshine. The annual rainfall diminishes towards the west, being somewhat less than 60 inches along the shore of the Gulf of Paria. Trinidad lies far enough south to escape hurricanes; only once in the past century did it feel the violence of one of these storms.

These physical characteristics of the island combine to form a checkerboard of habitats. In the east : wet mountains, wet plains, wet hills, wet plains, and wet hills again ; in the west a similar succession of mountains, plains, and hills, but with somewhat less rain and more sunshine.

Trinidad up to 1797. Trinidad was neglected during the first three centuries of European settlement in the Antilles. Efforts by Spain to colonize the island in 1532 and again in 1577 were not followed up. Sir Robert Dudley and Sir Walter Raleigh both visited the island and ravaged the Spanish settlements. Raleigh used asphalt from the Pitch Lake to caulk his vessels. During the seventeenth and eighteenth centuries, when the Dutch, the French, and the British were starting to plant sugar cane in the Antilles, Trinidad shared but little in this movement. While many of the other islands changed hands several times in this turbulent period, the island remained under loose Spanish administration. In 1783, however, many French settlers came to Trinidad where they were permitted to establish small plantations and by the end of the eighteenth century there was a small population of Spanish, French, and British planters with their Negro slaves. In 1797 British forces captured many of the colonies of other European nations in the Antilles, including Trinidad. While most of the colonies were returned to their former owners by the Treaty of Amiens in 1802, Britain retained Trinidad and British Guiana and Trinidad has been a British colony since that time.

By direction of the commander of the British forces in 1797 Captain F. Mallet made a new map of Trinidad which was published in London in 1802. The map shows the extent of the Spanish land grants, and distinguishes the properties used to produce sugar cane from those used for other purposes. This map is the basis for the map of Trinidad in 1797 (Fig. 1). Most of the island, after some three centuries of Spanish administration, was still clothed in tropical rain forest, interrupted in only a few places by what Mallet called "natural savannahs", presumably old clearings made by the Indians. There were four Indian missions around which the miserable remnants of the native inhabitants were clustered. All except the more remote parts of the island—parts which Mallet described as " inaccessible and covered with incorruptible woods "—were marked off in Spanish grants, each grant subdivided on paper into small 320-acre areas. But few of these subdivisions were actually occupied. The map shows that almost all the settled areas were along the immediate shores, especially on the shores of the Gulf of Paria on the drier western side of the island. The chief concentration of people was around Port of Spain, along the southern base of the Northern Range and in the valleys of that range north of the port. The mangrove-filled Caroni Swamp was unoccupied ; but south of it there was a continuous belt of settlement to, and somewhat beyond, the Pitch Lake. Isolated clusters of settlers occupied the end of the south-western peninsula, the Mayaro Bay District in the south-east, and the north-eastern extremity of the island. None of these settlements were connected to Port of Spain overland, for only a few Indian trails passed through the uncleared virgin forest. Connections with Port of Spain were by boat, and for this reason the most accessible places were along the immediate shore.

The areas devoted to various land uses were also indicated on Mallet's map (Fig. 1). The sugar cane area was along the sunnier western shore of Trinidad. Each small plantation had its own crude

mill for grinding the cane, and its huge cast-iron pans for evaporating the juice over open fires. The other plantations were mostly used for the island's chief crop, cacao, and also for coffee, and cotton ; but Mallet does not distinguish these. His map also shows a forest of coconut trees along the sand bar that separates the Nariva Swamp from the ocean.

Trinidad up to 1924. In the early years of British rule in Trinidad there was no marked change in the pattern of settlement or in the methods of land use. The acquisition of Trinidad and British Guiana caused a sufficient increase in the British sugar supply to bring a disastrous drop in prices. The earlier prosperity of places like French Sainte Domingue and British Jamaica was never reproduced in Trinidad. At the end of the slave period Trinidad was still a poor colony with a large amount of undeveloped but potentially productive land.

Slaves were freed in the British colonies in 1834, and between 1834 and 1838 there was a brief period in which the Negroes were treated as apprentices and retained on the sugar-cane plantations. But in 1838, when restrictions were removed, the Negroes all through the British West Indies left the sugar-cane plantations wherever they could do so. So many left the plantations in Jamaica, where there was an abundance of empty land in the interior, that between 1835 and 1838 there was a 50 per cent drop in sugar production. In British Guiana matters were even worse, for there was the whole empty backland into which the former slaves could escape. Only in Barbados, where there was no empty land and no escape from the plantations, did sugar production actually increase during this period. In Trinidad, however, the drop in production was only 20 per cent because the governor at once levied a tax on those who tried to occupy the crown lands. Still the basic problem for the sugar-cane planters was to find a sufficient number of workers. The census of 1844 gives Trinidad a population of about 60,000, compared with 377,000 in Jamaica, and 122,000 in Barbados.

In Trinidad an effort was made to solve the labour problem by bringing in East Indians, mostly from Calcutta, and mostly Hindu. The East Indians were brought in on a five-year contract, after which many elected to remain in Trinidad and became small free-holders. This immigration started in 1845, and by 1883 there were 48,000 East Indians in a total population of 153,000. Indian contract labourers continued to enter Trinidad until 1916. By 1921 the population had reached 342,523, of which East Indians, whites, and Negroes each made up about a third.

It was the East Indian labourers who made possible the rapid expansion in the production of sugar cane from 20,000 tons in 1850 to 67,000 tons in 1879.[3] Sugar cane spread not only around the original plantations along the Gulf shore, but also to other parts of the island. Cane was planted even in the far south-west, on the north-east point, and along Mayaro Bay. The forest was cleared, the cane fields planted, and the small sugar mills set up.

The technological revolution that changed sugar production from

Central Office of Infor

PL. 3. PITCH LAKE, TRINIDAD

The Pitch Lake, on the edge of the large oil field around San Fernando was caused by a natural eruption of oil. It was first observed by Columbus and used by Sir Walter Raleigh to tar his ships. It has a depth of 200 feet ; 25,000 tons of pitch are dug annually for surfacing the roads on the island. The remainder is dug by the Asphalt Company for refining and export.

Lorries which run on to the Pitch Lake sink up to their axles if they remain in one place too long ; a man will sink to his ankles within an hour. Workers on the Pitch Lake use a special matlock to dig the pitch. The porters wear a reinforced hat on which they can carry lumps weighing between 50 and 100 pounds.

Central Office of Information

Pl. 4a. MARACAS BAY—TRINIDAD

Trinidadians spend many week-ends at this palm-studded Bay which is only a two-hour journey from Port of Spain.

Central Office of Information

Pl. 4b. THE BANANA NURSERY AT THE CENTRAL EXPERIMENT STATION, CENTENO, TRINIDAD

This 120-acre nursery contains about 70,000 Cavenish banana trees (broad leaves) some of which are seen here growing under coconut palms; banana trees bear full-size fruit about fourteen months after planting. At this station research is also being undertaken on coconuts, sugar-cane and citrus fruits.

a primitive, small-scale, high-cost operation to a large-scale business came to Trinidad during the last quarter of the nineteenth century. It was forced on the West Indian planters by the competition of beet sugar, although for a long time they resisted the change and sought protection by government subsidy. The first modern, large-scale central factory was built in Trinidad in 1871, located a short distance inland from San Fernando—the Usine St. Madeleine, still the largest producer of sugar in Trinidad. Soon the transformation of the sugar-cane plantations was in full swing. Whereas each small mill had been

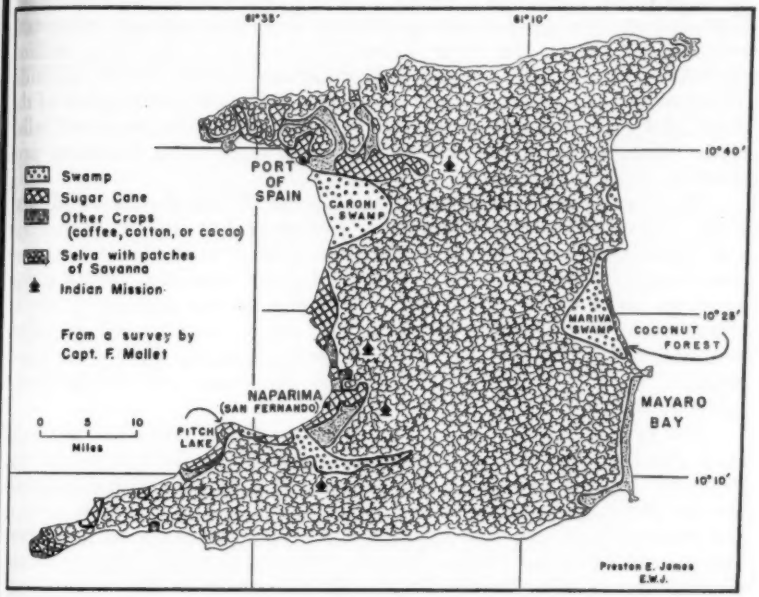


Fig. 1. Trinidad : Land use in 1797.

supplied with cane from the fields immediately around it and had been operated by the planter himself, the new large central factories needed at least thirty-eight square miles of cane plantations to operate efficiently.[4] Some of the large corporations used wage-workers to plant cane on their own lands, but an increasingly large proportion of the cane is now supplied by independent small planters.

The change from small-scale production to large-scale production brought important changes in the pattern of land use. Sugar cane withdrew from the parts of the island less suited to cane and concentrated, to the exclusion of other crops, on the better suited lands. The map of land use in 1924 (Fig. 2) shows that the sugar cane district occupied the western side of the island south of the Caroni Swamp where the average annual rainfall is over 50 inches. Penetration eastward had shown that in the wetter areas although cane growth was greater, the sugar content of the cane was lower because there was less

sunshine. The optimum sugar cane area in Trinidad had been found by trial and error, and was clearly marked by 1924. Here the population was also concentrated, with densities in 1921 of over 200 people per square mile.

Meanwhile, cacao was still Trinidad's most valuable product. According to George Viers [5] the cacao tree grew as a wild plant along the Amazon and Orinoco Rivers and in Trinidad. In 1797 the chief cacao area was in the pouch-shaped valleys of the Northern Range near Port of Spain. But the big increase in cacao planting came at the same time as the big increase in sugar cane—after 1850 when the East Indian immigration was providing Trinidad with an important new labour force. In 1850 Trinidad produced some four million pounds of cacao ; by 1879 it was producing twelve million pounds. Whereas the expansion of sugar cane resulted in the elimination of the forest, the expansion of cacao was carried on under the shade of taller trees. By 1895 Trinidad was second only to Ecuador in cacao production.

The map of land use in 1924 (Fig. 2) shows how the cacao plantations had spread over the island. After several centuries, cacao was still Trinidad's major export, and the prosperity of the local economy was closely geared to the rise and fall of cacao earnings. High cacao earnings continued in the early part of the present century until, in 1920, there was a sharp break in the world market, due to overproduction and to the increasing competition of the Gold Coast and Brazil. The price per bag of cacao in 1919-1920 was $23·90 ; the price in 1920-1921 dropped to $10.00.

The spread of cacao under the stimulus of high prices had brought land that was definitely inferior under cultivation. In fact doubt was expressed as a result of the survey in 1924 whether optimum conditions for the planting of cacao existed in Trinidad.[6] The difficulty is that the cacao tree is very susceptible to dryness. Its tender surface roots are injured when the surface layers of the soil dry out, as they would do almost anywhere in the tropics when exposed to direct sunshine. Wind, also, has a drying effect, even in areas of abundant rainfall. Wind dries out the small stems by which the pods are attached to the trunk and branches of the tree. In Trinidad the rainy eastern part of the island is exposed to the full sweep of the trade winds, even where the cacao trees are planted among taller shade trees. But in the western part of the island, where there is more protection from the wind, the rainfall is much less. Even in the sheltered pouch-shaped valleys of the Northern Range near Port of Spain, the rainfall is only about half as great as in the windy eastern part of the range. The drop of prices after 1920 was reflected in the fact that many plantations were left without cultivation and many trees were not harvested.

By 1924 there were several other crops to be seen. The natural coconut forest along Nariva Beach was being harvested, if not cultivated. Coconuts had been planted elsewhere, chiefly along the eastern shores, at the tip of the south-western peninsula, and around Port of Spain (Pl. 4b). Conditions for coconuts were described in 1924 as excellent, and coconut plantations were at that time in process of

spreading. There were also a few areas devoted to citrus fruits, rice, and rubber.

On the basis of information available in 1924, a forecast was made regarding the development of the land-use pattern.[7] Sugar cane would remain in approximately the same area, with increased production or decreased costs derived from more intensive methods. The cacao area would shrink, first from the more exposed, less suitable areas, eventually concentrating in the better areas. In the absence of a modern soil survey it was difficult to be certain of the location of the better areas, but it was suggested that the pouch-shaped valleys of the Northern Range and the hilly lands north-east of San Fernando

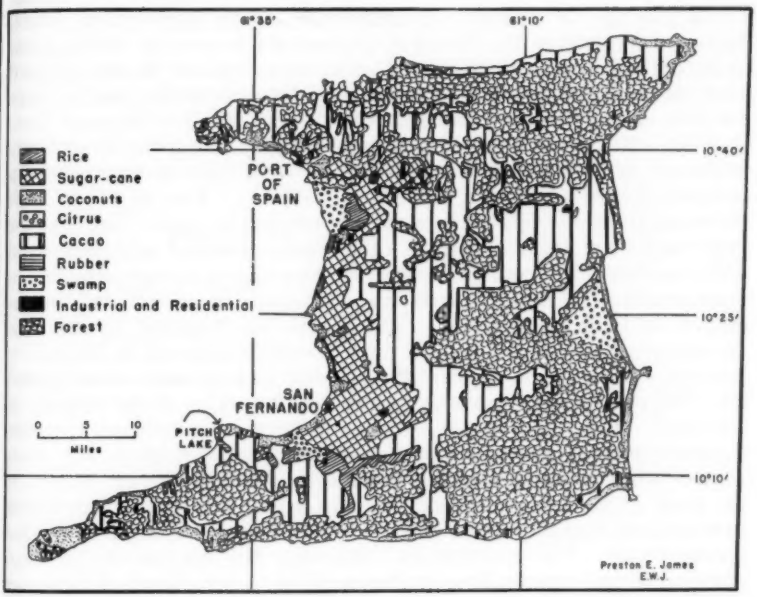


Fig. 2. Trinidad : Land use in 1924.

probably offered the best conditions for cacao planting in Trinidad. It was suggested, also, that the planting of coconuts would become more widespread, invading areas not so well suited to this crop as the areas in use in 1924.

Trinidad in 1955. Some twenty-five years later it is possible to look again at the land-use patterns of Trinidad. The map (Fig. 3) is based on a survey carried out in 1950 by the Imperial College of Tropical Agriculture. Since 1924, too, a soil survey of Trinidad has been completed and published by the college.

The map shows the extent to which the forecast has been verified. The sugar cane district still occupies approximately the same area as it did in 1924. The cacao area has undergone a marked shrinkage,

but not exactly as anticipated. Throughout much of the drier western end of the Northern Range, including the pouch-shaped valleys, there is now only scrub, second-growth woodland and patches of derelict cacao. The excellent cacao lands on the central hilly belt, north-east of San Fernando have proved to be, in fact, about the best in Trinidad, and are still productive. But the plantations on the windy, eastern side of the island are also still producing. The cacao plantations in the southern hilly belt, mostly operated by East Indians, are also continuing to produce, and have bcome derelict only in the Mayaro Bay area, and around the Pitch Lake. There has been little or no expansion of coconuts ; in fact a considerable area of coconuts near Port of Spain has disappeared.

Meanwhile, a number of unforeseen events have taken place. During World War II, Trinidad became an important strong-point in the defence of the Caribbean. United States military forces occupied parts of the island—the whole north-western peninsula, and a large air base east of Port of Spain, about mid-way between the east coast and the west coast. Large amounts of money were spent by military personnel in Port of Spain ; many roads were built or improved ; a modern airport was built, near Port of Spain. Port of Spain itself increased from 70,334 people in 1931 to 105,744 in 1950. The map for 1950 shows a notable expansion of the area classified as " industrial and residential ". San Fernando grew from 14,353 in 1931 to 32,867 in 1950, and entirely new industrial areas appeared in the hilly belt south-east of the Pitch Lake (Pl. 3). The fact is that Trinidad has become an important oil producer. Not only is asphalt removed in increasing quantities to pave the roads of Britain, but new oilfields were opened up. Oil now makes up about 75 per cent by value of the exports of Trinidad. Oil and asphalt production gives employment to some 17,000 workers ; whereas sugar cane production employs less than 16,000 workers throughout the year, and only a little over 21,000 at the peak of the harvest season. There are 10,000 people employed in manufacturing industries, and an equal number employed in service occupations.[8] The government, observing the success of the programme of industrialisation in Puerto Rico, has declared a five-year tax holiday for new manufacturing industries locating in Trinidad.

The government has also undertaken to regulate and support the agricultural activities of Trinidad. Sugar cane has been given support. In 1949, 158,890 tons of cane were harvested, which was the largest production on record. This was accomplished by the use of new methods of cultivation, and improved technology in the extraction of the juice and the preparation of sugar. Unseasonable rains in 1950 brought a much reduced harvest, but this was only a temporary set-back. Cacao dropped to its lowest point in 1945 with a production of only twelve million pounds—about the same as in 1879. But by 1950 it had climbed back to some sixteen million pounds. The government-sponsored Cocoa Rehabilitation Scheme had distributed over 200,000 new cacao seedlings, and had supported the replanting of some 560 acres (Pl. 4a). A subsidy was made available for any cacao planter who desired to convert his plantation to some other crop. An

expansion of citrus fruit, especially grapefruit, was being supported, and also a programme to increase the production of rice. Rice acreage was doubled between 1938 and 1948. Meanwhile the coconuts of Trinidad have ceased to be exported. The whole production of copra is purchased by the government to be made into edible oil, margarine, and soap. During the war the imports of olive oil were cut off, and it was necessary to find a local product to use as a substitute in cooking. The price set for the sale of coconuts and copra provides the planters with adequate compensation, but does not lead to further expansion.

The West Indies. Now Trinidad faces the beginning of a new era in its historical geography. In accordance with the policy of Great Britain

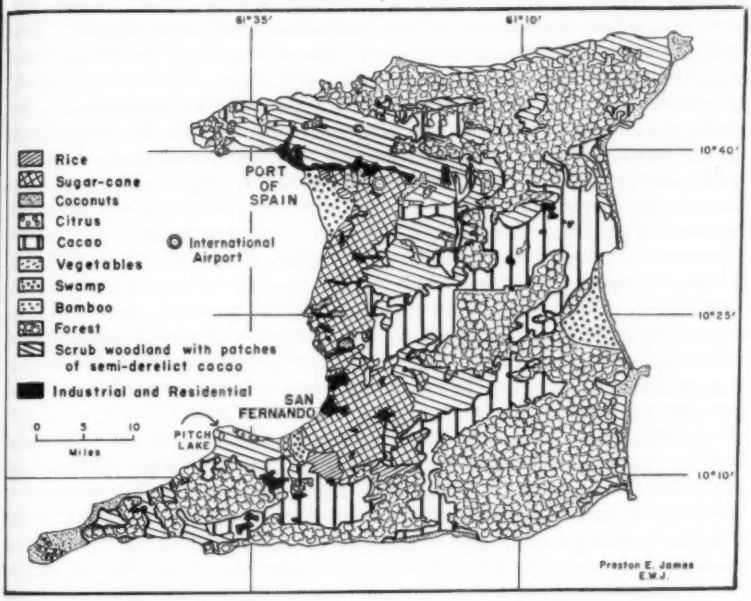


Fig. 3. Trinidad : Land use in 1950.

all the former British colonies are being advanced as rapidly as possible to self-government within the framework of the Commonwealth. One of the most interesting of the new States is the West Indies established as a self-governing member of the Commonwealth on the 1st of January, 1958. This includes Trinidad, Jamaica, and Barbados, the Leeward Islands and the Windward Islands. The national territory is made up of scattered small islands, extending north and south in an arc some 600 miles long, with Jamaica lying a thousand miles to the west, and Barbados one hundred miles to the east. The total population in 1953 was a little over 2,800,000 of which more than half, about 1,500,000 were in Jamaica, and 700,000 were in Trinidad. Except for Trinidad where there is oil and asphalt, and Jamaica which has recently developed important deposits of bauxite, the economy of the islands is

purely agricultural. The income per capita is very low, averaging in 1953 only £82 (Trinidad £121, Barbados £79, Jamaica £73—all the others less than £70).[9]

The British Caribbean Federal Capital Commission, after study of the possible location for the capital, recommended Barbados, Jamaica, and Trinidad, in that order. But in 1957 it was voted to select Trinidad as the capital.

The creation of the new State, and the selection of Trinidad as its capital, will inevitably bring important changes in the economy of Trinidad and in the patterns of land use. There will, of course, be a considerable increase of the population. In addition to those directly employed by the federal government and by the representatives of foreign nations who will come to live at the new capital, there will be many other new sources of employment in providing food supplies and in serving the needs of these people. The other islands, moreover, are very densely populated, especially Barbados which has more than 1,300 people per square mile. In return for being accepted as the federal capital, Trinidad agreed to admit immigrants from the other islands freely. It is to be assumed that there will be a large movement of people from the more crowded islands into Trinidad. Some will find urban employment, but a large number will turn to agriculture, possibly the production of dairy products and other foods. There is pressing need that this prospective new settlement and the new forms of land use should be guided by an over-all plan. Persons experienced in the formulation and administration of similar land plans elsewhere, such as in Puerto Rico, should be entrusted with this important undertaking. It should not be left to the politicians, however sincere may be their intentions.

In one way or another, whether planned or unplanned, Trinidad will be quite completely transformed, its present forms of land use surrounded and perhaps even submerged by an entirely new kind of rural settlement oriented toward the supply of a large city. The federal buildings and the area around them will, in themselves, constitute an entirely new and spectacular addition to the landscape of the island. Soon even the inaccessible and incorruptible woods will exist only as a memory.

[1] Preston, E. James, Geographic Factors in the Trinidad Coconut Industry, *Economic Geography*, 1926, 2 : 108-125 ; *idem*, A Geographic Reconnaissance of Trinidad, *Economic Geography*, 1927, 3 : 87-109.

[2] Preston E. James, Some Geographic Relations in Trinidad, *Scottish Geographical Magazine*, 1926, 42 (2) : 84-93.

[3] J. H. Parry and P. M. Sherlock, *A Short History of the West Indies*, London, 1956, p. 238.

[4] Raymond W. Beachey, *The British West Indies Sugar Industry, 1865-1900*, Ph.D. Dissertation at the University of Edinburgh, 1951.

[5] Georges Viers, Le cacao dans le monde, *Les Cahiers d'outre-mer*, 1953, 6 : 297-351.

[6] *Loc. cit.*, A geographic Reconnaissance of Trinidad, p. 100.

[7] *Loc. cit.*, Some Geographic Relations in Trinidad, p. 93.

[8] Colonial Reports, *Trinidad and Tobago*, 1950, published 1952 ; and Starck, A. R., Overseas Economic Surveys : *British West Indies, Eastern Caribbean*, 1951.

[9] Colonial Office, *Report of the British Caribbean Federal Capital Commission*, London, 1956.

THE ROADS OF SCOTLAND
II. STATUTE LABOUR ROADS: THE SECOND PHASE

DONALD G. MOIR

By 1669 it was clear that the fifty years struggle to get new highways had failed, and that new legislation was needed. So in that year Parliament passed a new "Act for repairing High ways and Bridges" narrating that "Our Soverane Lord Considering how necesser it is for the good of the people That hie ways be made and maintained for readie and easie passage travell and traffick through the Kingdom; And that the care thereof which hath been layd upon the Justices of Peace hath yet for the most part proven ineffectuall In regaird the saids Justices have not had speciall orders and warrands for that effect. For remeid whairof his Majestie with advice and consent of the Estates of Parliament, Doth Appoint & Ordain the Shirreff of the Shire and one of his Deputies being always ane heretor therin, And the Justices of Peace in each Shyre to conveen at the heid Burgh of the Shyre Upon the first tuesday of May yeerly for ordering of highways bridges and ferries." They were to make a list and survey of the highways, bridges and ferries, to divide the work between the parishes, and to appoint overseers to see that the work was done. They were to call on all tenants, cottars and servants by public intimation at the parish kirks upon the Sabbath day immediately after the first sermon, to have in readiness "horses, carts, sleds, spades, shovells, picks, mattocks, and such other instruments as shall be required for repairing of the saids high ways". Their work was not to exceed six days yearly for the first three years and four days thereafter, and "only betuixt the bear seid (sowing season) yeerlie, and hay time or harvest thereafter". For failure to attend the Justices could poind the goods of the absentees to the value of twenty shillings Scots for each man, and if they had no poindable goods, "to punish them in their persons as they shall sie cause". The highways were to be twenty feet broad at least, and to be fit for horses and carts to travel on in summer and winter.

As the work of the inhabitants would not be sufficient for all that had to be done, an important new feature was introduced. The Justices of Peace were to prepare a statement of the money required for highways, bridges and ferries, and were then to collect from all the heritors in the shire a 'stent', or rate, "not exceiding 10 shillings Scots upon each hundredth pund of valued rent." If this stent was not sufficient for the work, the Privy Council was empowered to levy tolls at bridges, causeways and ferries. The Convener of the Justices in each shire was required to give an account of the progress of the work on the succeeding third Tuesday of July, and annually thereafter, to the Lords of the Privy Council, who were empowered to punish the heritors and Justices for any neglect of their new duties.

An Act of the 22nd of August 1670 made two changes: 1. The six days work could be done at any time or season most convenient, except seed time or harvest; and 2. Those living at a great distance

from the highway could escape the work on paying six shillings yearly, the money to be used in employing other workmen to work in their place.

On the 7th of April 1670, on the same day as they were issuing orders to the commanders of the forces to suppress conventicles, the Lords of his Majesty's Privy Council also gave attention to the highways : " considering how farr the intent of this act may be frustrat in severall places of the Kingdom where these nominat to be justices of peace have refused to accept and act in that capacity, therfor the saids Lords doe appoynt the commissioners of excyse to be oversiers in the respective shyres for putting the said act in execution ". At the same time they sent a copy of the Act to the sheriff in every shire, requiring him to convene the justices or commissioners and to see the Act put into force.

But even in Edinburgh on the doorstep of Parliament its commands went unheeded. Almost a year passed, and on the 7th of March 1671 the Privy Council had to record, that " the justices of peace in the severall shyres and the magistratts of Edinburgh, as justices within themselves, have made no progres in repairing the hiewayes, bot have altogether neglected to execut the orders injoyned to them by the forsaid act, and have not made report of their proceidinges to the Councill, therefor the Lords of Councill doe give order and warrand to direct letters for charging the magistratts of Edinburgh to compear before them the first Councill day in Apryle nixt, and the justices of peace in the severall shyres to compear the first Councill day in June nixt by tuo or thrie of their number to answer for their negligence in not prosecuting and performing what is committed to them by the forsaid act of Parliament, and to hear and sie such censur and punishment inflicted upon them as their neglect does deserve, and to hear and sie other persons appoynted oversiers by the Councill for putting the said act of Parliament in execution ".

On the 20th of July 1671 the justices of peace for the town and shire of Edinburgh, the shires of Haddington, Berwick, Roxburgh, Fife and Clackmannan, and also the commissioners of excise of these shires were fined £40 Scots for their last year's neglect, the money to be applied for repair of the highways, but collection of the fines to be cancelled if they carried out their duties by the 1st of November. The Council also appointed an individual in each shire, generally a nobleman, to be overseer, with power to call together the justices of peace, to fine them if absent, to put into force the act of 1669 in all its details, and to report progress by the 1st of November next.

Not all the shires came in for censure. It was reported in March 1671 that " the justices of peace in the sheriffdom of Lanark in pursueance of the act of Parliament, have been at great paynes and expenses in repairing the hiewayes within the said shyre, and especially the hieway leading westward from Blackburn by the Kirk of Shottes, and have made the same a sufficient and convenient way not only for horse and foot bot lykwayes for coaches and cartes, which I.ow do ordinarily passe that way, whereas formerly they went by Falkirk." At their request the Privy Council authorised a toll of six shillings and eightpence Scots on every laden cart passing the Kirk of Shotts for

maintenance of the highway. In December 1671 the Justices of the shire of Angus reported that they had " surveyed and listed the hiewayes and bridges within their shyre, and did appoynt severall persones in the respective places to proceid to the reparation thereof, and, for the better and more speedy effectuating of the Councills commands, did impose a stent of ten shillings Scotts upon each hundreth pound of valued rent belonging to the heritors of the shyre and of tenements and other burgh lands. Notwithstanding whereof, the burghs of Dundy and Montrois refuise to pay the said stent, pretending that, being burdened with the reparation of their cassayes within burgh, they are not holden to contribut to hiewayes and bridges outwith their owne liberties ". The Lords decided that all the burghs were liable to pay the stent.

Months later, on the 15th of August 1672, Edinburgh again came in for severe censure. " The Lords of his Majesties Privy Councill, considering that the highway leading from the Abbay of Hallirudhouse to Leith is very bad and scarcely passable with coaches and cartes, the same being altogether neglected by the magistratts of Edinburgh, who ought to cause repair the same as being within their bounds and liberties, therefore the saids Lords doe ordaine the saids magistratts of Edinburgh to cause repair the said high way leading from the Abbay of Hallirudhouse to Leith betuixt (now) and the first day of November nixt, and that under the paine of one thousand pounds Scotts money to be payed be the saids magistratts out of their owne privat fortunes and whereof they are not to have any releiff out of the common good of the said burgh, and . . . notwithstanding the said fyne, if it shall happen to be incurred and exacted that the saids magistratts shall still be oblidged to repair the way forsaid."

No attention seems to have been paid to this warning, for the shire of Edinburgh heads the list, and the town of Edinburgh ends the list, of the delinquents who on the 7th of March 1673 received a further reminder from the Privy Council that they had not returned an exact account of their diligence. The Council insist that the Act must be enforced and go on to repeat long detailed instructions about how the work on the roads is to be done " speciall care being alwayes had of the highwayes leading from one royeall burgh to another, and cheiflie of these leading to the city of Edinburgh, and to command them to proceid and perfyte that part committed to their charge, and to report to the Councill the names of such as shall either refuse or neglect that they may be called and fyned by the Councill ; to cause the haill tennents and cottars work the dayes appointed for this year, and so many moe as they have neglected in any of the bygaine yeares, and to fine and punish those who shall refuse or neglect their deuty and to employ the fynes for the use forsaid." They were to be careful to ditch and fence the highways conform to the act of Parliament, and, for this purpose, to draw headrigs along both sides of the highways where the land was arable.

These instructions with minor variations went to the town of Edinburgh and all the shires except Kinross and Peebles ; but neglect still continued. In May 1674 the Privy Council recorded that full

reports had not been returned by the overseers, and that there had not been such progress made in repairing the highways and bridges as might have been done if diligence had been used, and they request a report in December next under penalty of £100 sterling. And in January 1676 we find them complaining that the highway between the Bishopesbridge and the burgh of Glasgow is " become altogether impassable by coatches, cairts, waines or slaides and therby many people in their passage and commerce have susteaned great prejudice and damage " and therefore it must be repaired.

Evidence of progress in some shires is shown by a supplication to the Council by Archibald Wilson, bailie of Queensferry, in November 1675, craving payment of his account for the repair of the highway between Cramond Bridge and Queensferry. Wilson, who must rank as one of the earliest road contractors in the country, had expended £2,249, 3s. 8d. Scots on the repair of the road, and had received from the parishes and from the collector only £893, 16s. He had applied to the commissioners and Justices of Peace for Linlithgowshire for payment of the balance ; they found " it just that the applicant should be reimbursed of the forsaid account but knew no way how the same should be gott without the Councills order ". The Council therefore recommended the Justices to collect the stent of ten shillings Scots on every £100 rent in order to meet the contractor's account. Wilson had some difficulty in collecting his money, for in July 1677 the Council granted letters of warning against several heritors in Linlithgowshire who had not paid him.

In a period which saw the battles of Drumclog and Bothwell Bridge (1679), it was no doubt difficult to get men to turn their minds to new roads. In 1680 the highways in Midlothian were as bad as ever; the " noblemen, gentlemen, and all others goeing to and frae the burgh of Edinburgh " complained to the Privy Council that the public highway from the Clockmilne Bridge to the Magdalene Bridge " is become so ruinous that the petitioners, who are necessitat to passe that way tending to and from the city of Edinburgh as well by coatches, horseback or on foot, and having use of carts and horse loads for transporting their goods, merchandize and other materials and necessars that way to and from the said toune both by day and night, are in hazard in their passadge of their lives either by their coatches overturneing, their horse falling, their carts breaking, their loads casting, and horse stumbleing, the poor people with the burdens on their backs sorely grieved and discouradged ; and that the same highway being so publick ane entrance to the metropolitan citie of the kingdome, strangers passeing the same doe often exclaime thereat, so that not only the privat interest of all persones concerned but also even the honour of the Kingdome doth call for a speedy reparation of the (same) ". The Privy Council therefore granted their request for a toll of sixpence Scots for each loaded cart, and twopence for each horse with a load, going from the Clockmilne to Magdalene Bridge. In August of the same year similar tolls were authorised for three years on the Edinburgh to Dalkeith road between the Clearburne and Peffermilne, and on the Edinburgh to Liberton road.

These isolated efforts merely show that neglect was still general, and an exasperated Privy Council appointed a Committee in October 1681 "to meet and consider what is fit to be done anent the highways in generall through the whole kingdome". In June 1683 a new proclamation was made "anent the maintenance and repair of bridges, highways and ferries", in which, after reciting the former Act and orders, it was admitted that "notwithstanding whereof the said act hitherto hath taken little or no effect". All the persons concerned were therefore instructed to get on with the repair of highways and bridges, and to report annually to the Privy Council in November, and so that everyone might know his duty the proclamation was to be read at market crosses and parish kirks.

The proclamation was repeated after James VII came to the throne in 1685, the commissioners of excise and Justices still being "most negligent and remiss in performeing of their duety". They were each to be fined ten merks Scots for each meeting's absence, and the Privy Council was to punish them as they thought fit. The proclamation had no more effect than earlier ones, for on the 28th of May 1686 Parliament passed an "Additional Act anent High-ways and Bridges", confirming former acts and requiring the Sheriff of the shire to intimate to the Justices the date on which they were to meet to put the Acts into operation; if he failed to do so he was to be fined 500 merks Scots for each day's non-attendance. As the roads were now so bad, the period of work was increased to six days yearly for the first five years instead of three years.

By now some results were beginning to appear from the Privy Council's persistence and longsuffering. The Justices in Stirlingshire were active in bridge construction and highway repair from 1660. In Aberdeenshire the Justices met in July 1686 and issued detailed instructions, naming the commissioners in each presbytery and listing the roads which should first be repaired. But in the same year the Privy Council had to take action against the Justices of Linlithgowshire for failing to carry out their duties, and followed this action by remitting to the Earls of Lauderdale and Linlithgow to consider the case of the still neglected highways and bridges in the shire of Edinburgh. A visitor of the time, Thomas Morer in 1689, confirms the bad condition of the roads:—"Stage coaches they have none, yet there are a few hackneys at Edinburg, which they may hire into the country upon urgent occasions. The truth is, the roads will hardly allow 'em these conveniences, which is the reason that their gentry, men and women, chuse rather to use their horses. However, their great men often travel with coach and six, but with so much caution, that, besides their other attendance, they have a lusty running footman on each side of the coach, to manage and keep it in rough places."

BRIDGES

The first bridge mentioned in the Privy Council records after the passing of the 1669 Act is again the bridge of Cramond, which in 1673 along with "another bridge, called the Newbridge, are in hazard to

be ruined if they be not speedily repaired " ; as both bridges were on the boundary between the shires of Edinburgh and Linlithgow, the Privy Council instructed the Justices of Peace of both counties to get together and decide on the repairs. A year passed with no progress, and the Justices were then given three weeks in which to report their proposed action. Three years later, in 1677, the Privy Council record that they have considered the report that repair of the two bridges would cost between 3,000 and 4,000 merks, and that immediate repair is necessary, " otherwayes by the first violent spait of watter Crawmond Bridge will goe to the ground " ; they accordingly grant tolls on horses, carts, cattle and sheep using these bridges or crossing at the adjacent fords. Apparently Cramond Bridge could not wait on the accumulation of tolls, and in 1678 the Privy Council approved a levy ten shillings on every £100 of rental in the shires of Edinburgh and Linlithgow for repair of the bridge, leaving the tolls to be used for general highway repairs.

The condition of Paisley Bridge was considered by the Privy Council in 1673. It was then described as " a great fabrick and indispensibly necessar for all passengers to and from the east and west ", but nearly ruinous. As its repair would cost 5,000 merks, and the present tolls hardly amounted to £30 Scots yearly, the bailies of Paisley were accordingly granted power to increase the tolls. The increased tolls proved far from adequate, and in 1676 the bailies contracted with the Master of Works at Glasgow to repair the bridge at a cost of 3,600 merks, to defray which the Privy Council approved a levy of twenty shillings Scots on every hundred pound of rental in the county.

The Privy Council also dealt in 1674 with a complaint about the voluntary collection authorised in 1665 for bridges over the Dye and the Spitleburn on the Cairn o' Mount road, and they instructed all archbishops and bishops to require all ministers " to cause collect the said contribution by sending their elders and deacones throw the paroches to the severall families, exhorting all persons according to their ability and power, especially persones of quality, to contribut for so good a work ". The commissioners for Stirling are in 1674 instructed to consider replacing the timber bridge of Tullibody with a new one of stone, and for this purpose the Privy Council approved a levy of ten shillings per £100 on rents within Clackmannanshire.

In 1675 a James Williamson, miller at Calder Mill, reported " that the watter of Calder being ane impetuous runing water in the highway betuixt Edinburgh and Air, many people have been drowned therein in the petitioners sight, being much moved, he did, with his owne hands and upon his owne charges and expensses, build ane large and fair stone bridge over the said water, and hath also . . . made ane caulsey thro the reid mosse where many travellers and carryers with their loadinges were lost in the winter tyme, and by the forsaids tuo good works the petitioner is almost impoverished " ; the Lords accordingly approved a voluntary contribution to reimburse him.

For the repair of Abbey Bridge and Linton Bridge tolls were authorised in 1677 at Linton Bridge and adjacent fords, but in 1678 this was altered to a levy of ten shillings Scots per £100 of rental ; the

Privy Council warning the Justices of Peace in East Lothian that failure to do their duty would be punished as rebellion. It is interesting to note, in passing, that the Bridge of Ayton was to be repaired, and a causeway to it made in 1679, out of part of a fine of 2,000 merks laid on Lady Aytoun for her irregular marriage.

In 1680 a petition for a voluntary contribution for a bridge over the Leven at Dumbarton narrates that " the want of a bridge in that place does very much prejudge the trade of cowes, which is one of the most considerable commodities of the nation, and which cowes are either stopt when the storm is great and so starved or in swimming over are extreamlie weakned and oft times drowned or in hazard thereof, nor is there any safety or security for his Majesties subjects themselves in these great stormes, they being very often stopped and too frequently drowned, so that they are forced to goe about by the bridge of Striveling, which is twenty-four myles of unsecure and rough gate (road), where there is neither meat nor safety for the passingers nor cowes ".

A petition by the magistrates of Inverness in 1680 gives this information : " The ancient burgh of Innernes being situat upon the famous and great river of Nesse, the inhabitants and such as resorted thither were within these few ages served by boats in their passadge over that river, which by reason of frequent spaits and inundationes proving very dangerous, expensive and uncertaine and often hazardous to the lives of passingers, whereby the trade of that burgh became (sic) exceedingly to decay, there was a timber bridge built by the help of good neighbours (there being considerable quantities of great timber then in the neighbouring places), so that since the said burgh hes been in a tollerable condition as to trade and commerce and the repaire of all sorts of people . . . but the said bridge becoming ruinous, the petitioners in repaireing of it involved themselves in above ten thousand pounds of debt, and now the foundations thereof are become so rotten and weak that hardly any person will adventure to passe the same ; and, lately, the same haveing brocke, about sixty or eighty persons fell in the water, most of whom were hurt and all in hazard of perisheing ". The town therefore proposed to build a stone bridge and for this the Privy Council granted a voluntary contribution to be collected throughout the kingdom. Bailie William Duff of Inverness kept detailed accounts of all the sums collected for the bridge and spent on it. The voluntary contributions amounted to £5,924, 16s. 6d. (Scots). The three largest donations were £1,200 from the Lairds of McLeod, £400 from the town of Glasgow, and £367 from the " six kirks of the high towne of Edinburgh ". There were other sums from the kirks of North Leith, South Leith and the Canongate, and many small amounts from other presbyteries. The total expenditure amounted to £8,554, 11s. 6d. Scots, *i.e.*, £427, 14s. 7d. sterling.

In 1685 Parliament passed the " Act concerning Vacant Stipends " providing that " the Vacant Stipends of all churches in time coming shall be Imployed on pious uses within the respective parochins by the patron, and more particularly for the building and repairing of Bridges (etc) . . . the Vacant Stipends in the Dioceses of St. Andrews, Edinburgh,

Dunkeld, Dumblane and Brechin for fyve yeares shall be Employed for repairing of the Gair (Guard) Bridge, Crawmond Bridge, and Newliston Bridge, (etc) ".

In this long struggle to get the bridges repaired Cramond Bridge was the first to be named in 1567 ; in the course of a century its ruinous condition has been described time and time again but all the orders and instructions to repair it have had no effect. The Privy Council in 1687 report : " Forasmuch as their haveing bein a comittie of his Majesties Privy Councill appointed to consider the state and condition of the bridges of Cramond and Newbridge now altogether ruinous, . . . his Majesties Privy Council, . . . hereby grant order and warrant for uplifting to the effect forsaid the impositione following, viz., aff every horse with a load cairt or wain, eight pennies Scots, aff every horse, nolt or cow going to be sold at mercat sex pennies Scots, and aff every score off sheep going to be sold at mercats twelve pennies Scots as they shall passe the saids bridges of Cramond or Newbridge or at the foord close by the Newbridge, or at Cliftoun foord being half a myle or thereby from the Newbridge, or at Kirklistoun foord ; which imposition they declare to continow and to be exacted for the use forsaid dureing the space of seven years after the date hereof. And to the end their may be a publict roup made of the same farme . . . these who will take the same custome may appear before the Lords of his Majesties Privy Councill. . . ." At long last the Privy Council's efforts bore fruit ; an inscription which can still be seen on the bridge reads : " Repaired Be Both Sheires 1687 ".

The hazards of travelling at the end of the seventeenth century and the urgent need for bridges through increasing trade and traffic, are illustrated in this petition to the Privy Council by the bailies of Lanark in 1695 : " The violent current of the river of Clyde near the said burgh, where there has been a ferry boat keeped for transporting passengers to and from the west country, does not only render the said river frequently impassable to the great incomodation and prejudice of his Majestys lieges But likewise has several times carried away the said boat with passengers in her, over a high Linn called Stonebyres Linn whereby and by others passing the said river at fords, many have lost their lives and perished in the said water . . . the petitioners . . . have judged it very necessary for the safety of passengers and for encouragement of trade and commerce that a sufficient stone bridge be built over the said river Clyde near the said burgh at the foot of the Insh of Clydeholme ". The Privy Council authorised a free voluntary collection for the bridge to be made within all the parishes and at the doors of all the parish churches and meeting houses throughout Scotland, and recommended all ministers to make intimation of it in their churches. Without waiting for the collections to come in the bailies went ahead with the work, and by October 1696 had expended so much more than had been collected that they asked for, and were granted, an allocation from vacant stipends. Another petition in 1698 reveals that the collections had amounted to less than 2,000 merks (£66, 13s. 4d. sterling), that the recommendation to the Lords of the Treasury for some vacant stipends had taken no effect, that the work

was now far advanced, and that it was clear that the cost would exceed 24,000 merks. The burgh therefore requested a grant out of the vacant stipends and other help to meet its outlays but it was not until 1703 that Parliament authorised customs to be levied on all persons, horses, cows and sheep crossing the bridge.

The Eighteenth Century

By 1718 so little progress had been made with the highways that the new Parliament in London found it necessary to pass another " Act for amending and making more effectual the Laws for repairing the Highways, Bridges and Ferries in that part of Great Britain called Scotland ", which, in addition to repeating the terms of the earlier acts, extended the statutory service to ' labouring men ', and required the Justices to make annual reports to the Lords of Justiciary at their circuit courts. The screw was being tightened but even without this the effect on commerce and traffic of the wretched condition of the roads, and the lack of bridges, were making the Justices realise that the acts must be enforced, and throughout the eighteenth century the Statute Labour Acts were gradually brought into operation throughout Scotland. The results, however, were far below the needs of the time. In many places roads were still being described late in the century as impassable for coaches and dangerous for persons on horseback. The farmers, cottars, servants and labouring men might have shown some interest in roads near their homes, but objected to travelling several miles, without any allowance for travelling time, to work on roads they were not likely to use, and there were always absentees. Various county acts were passed at different times in the late eighteenth and early nineteenth centuries to allow the personal service to be commuted into a money payment, and by 1859 the statute labour had been ' commuted ' in all but two counties—Bute and Zetland. The roads maintained with this money were sometimes called ' commutation roads ', but the official title was still Statute Labour Roads. In Bute the statute labour of 1859 consisted of six days labour yearly from 6 a.m. to 6 p.m. with an hour off for breakfast and an hour for dinner. A number of the tenants and cottars chose to pay the commutation money but a great number of the small tenants found it easier to give their time than to pay sums of six shillings to twenty-seven shillings and sixpence yearly, depending on the size of the tenants' holding. In Zetland the statute labour in 1859 consisted of four days yearly, or payment of sixpence a day commutation money.

In 1859 there were 14,446 miles of roads in Scotland, all secondary roads, still being maintained under the Statute Labour Acts. But so unsatisfactory had been the system that from 1749 Turnpike Trusts began to take over the main roads until, in 1859, 5,678 miles were maintained as ' turnpike roads ',[1] under which tolls were charged on all using the road.

[1] To be discussed in a later article. *Sources :* Acts of the Parliaments of Scotland. Register of the Privy Council.

CERTAIN ASPECTS OF VEGETATIONAL HISTORY IN NORTH-EAST SCOTLAND

S. E. Durno

Pollen analyses from a number of peat mosses in North-East Scotland reveal the influence of climatic and biotic factors on the history of the vegetation in that area.

The sites (Fig. 1) from which samples were taken for analysis are divided geographically into a coastal and an inland group as follows :—

NAME OF PEAT MOSS	ALTITUDE O.D. FEET	DEPTH OF PEAT FEET	GRID REFERENCE
GROUP A. COASTAL			
1. Strichen	300	20·0	NK 915555
2. St Fergus	150	23·6	NK 055535
3. Rora	150	13·4	NK 045510
4. Netherley	400	21·6	NO 860940
GROUP B. INLAND			
5. Burreldale	500	16·1	NJ 825238
6. Skene	350	18·0	NJ 762108
7. Candyglirach	250	16·0	NJ 745015
8. Maud	400	22·3	NO 625995

Table 1.—Position, Altitude and Depth of Selected Peat Mosses in North-east Scotland

Strichen, st fergus and rora mosses lie on the undulating Buchan coastal plain within a ten-mile radius of Fraserburgh.

Netherley moss is a well-defined basin lying among the low foothills at the eastern extremity of the Kincardineshire Grampians.

Burreldale moss occupies a trough in hilly country to the north-east of the Don valley in central Aberdeenshire.

Skene moss fills a depression in low-lying country between the valleys of the Don and the Dee.

Candyglirach and maud mosses of Deeside lie in hollows on the fringe of the Grampian foothills.

According to the Blytt and Sernander climatic periods, peat formation in these mosses, which are all of the raised-moss basin peat type, started in Boreal time—in zone V or VI of the pollen analysts.[1] The stratigraphy of a profile shown in Figure 2[2] is typical of the inland mosses but the pine layer is not usually found in peat deposits of the coastal belt which are otherwise similar. In order to show regional differences of pollen frequencies in a graphic and concise way, the pollen analytical data are presented in the form of histograms which are in fact generalisations of the customary type of pollen diagram.

The ratio of arboreal pollen to non-arboreal (Fig. 3) gives an indication of the extent of woodland in any period. The earlier climatic amelioration of the region near the coast (group A) is shown

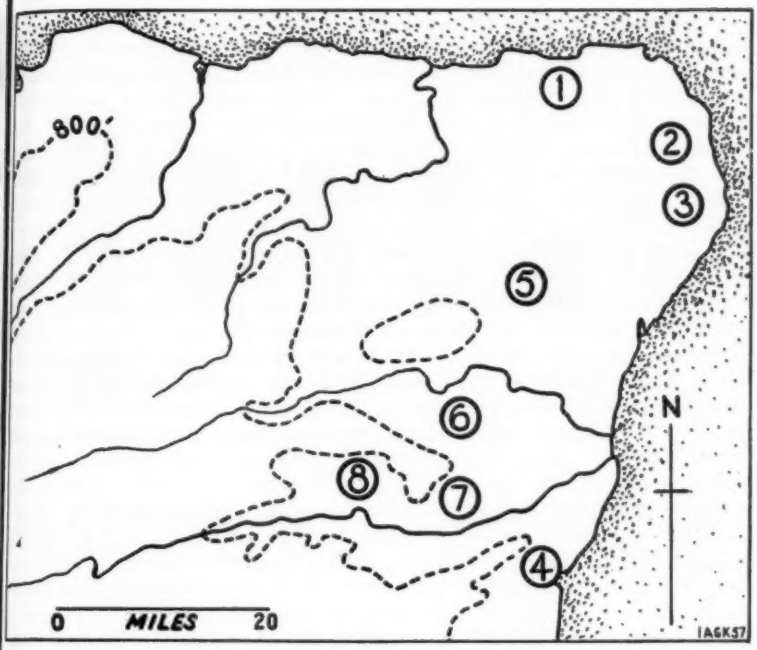


Fig. 1. North-east Scotland showing sites of peat mosses 1 to 8.

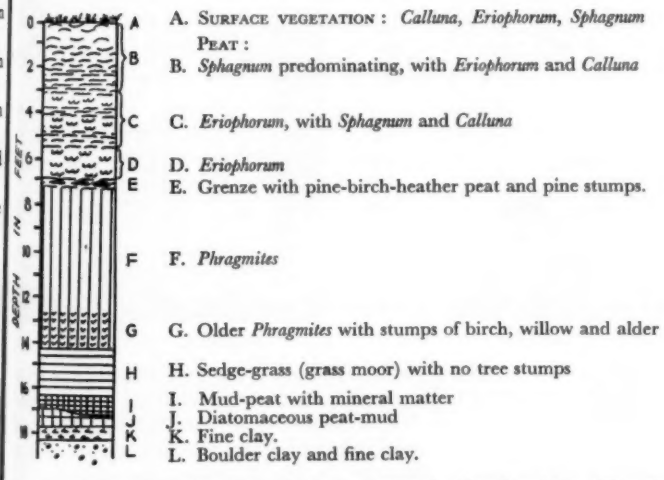


Fig. 2. Section through a typical basin peat, Deeside, Aberdeenshire. (*From G. K. Fraser.*)

by the frequency of arboreal pollen in zone V (early Boreal). It is only in this period that tree pollen of the coastal group is higher than

the inland group thus revealing the earlier advance of forest on the low ground. However, by the time of the late Boreal (zone VI) forest had become well established near the higher land and had even reached a relatively greater abundance there. Trees maintained a proportion of from 50-75 per cent from early Boreal time (zone V) until the sub-Boreal (zone VIIb). Following this period both groups decline by 38 per cent but not in the same way. It is most significant that group A drops by 32 per cent in zone VIII while in the same period group B drops by only 14 per cent. This is surely due to forest clearance carried out by the early settlers of the late Neolithic and Bronze Ages. Between 2000 B.C. and 1500 B.C. (sub-Boreal period) there was a regular colonising movement by Neolithic peasants who eventually reached the coasts of Aberdeenshire after crossing from bases on the north shore of the Moray Firth to the mouths of the rivers Nairn and Ness. At roughly the same time Beaker folk arrived from southern Britain or across the North Sea ; Childe describes them as follows, " These round-headed invaders were more pastoral and more war-like than the ' Neolithic ' peasants and perhaps more worldly, more ready to appreciate metal when it arrived. From the coasts they spread inland occupying the whole of Aberdeenshire where they retained their identity till the late Bronze Age . . ." [3] Other colonists of the same groups followed the route of the earlier Neolithic people and in due course from the Nairn-Ness valley reached Aberdeenshire where they continued to practise a predominantly agricultural way of life. With the use of metals man became able to intensify his influence on his environment. Later Celtic invaders using iron tools were able to clear and drain the land rendering it more suitable for cultivation and a rapid growth of population.[4] The effect of this phase of clearance is seen in zone VIII (modern) when the greater fall of tree pollen—21 per cent—occurs in the inland group while the corresponding fall in the coastal group is only 6 per cent.

ZONES	VIIb	VIII	VIII (modern)
Group A (coastal)	60	28	22
Group B (inland)	65	51	30

TABLE 2.—TREE POLLEN PER CENT OF TOTAL

The figures in Table 2 give a picture up to more recent times when forest was much more extensive in the landward areas of the north-east than on the coastal plain which was indeed already depleted of most of its woodland. It is possible that climate also helped to effect this differential reduction of forest ; in the deteriorating climate of the sub-Atlantic, trees probably grew and regenerated less successfully near the coast than in more sheltered localities inland. The influence of climate on the vegetation has manifested itself also through changes

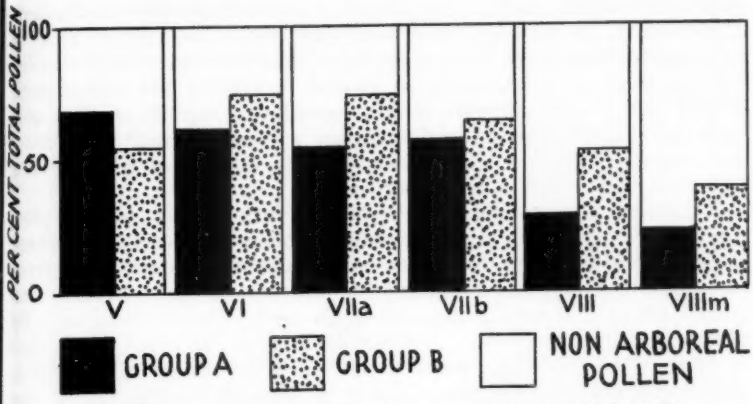


Fig. 3. Tree pollen, as percentage of total pollen, in coastal (A) and inland (B) groups in each zone V-VIIIm.

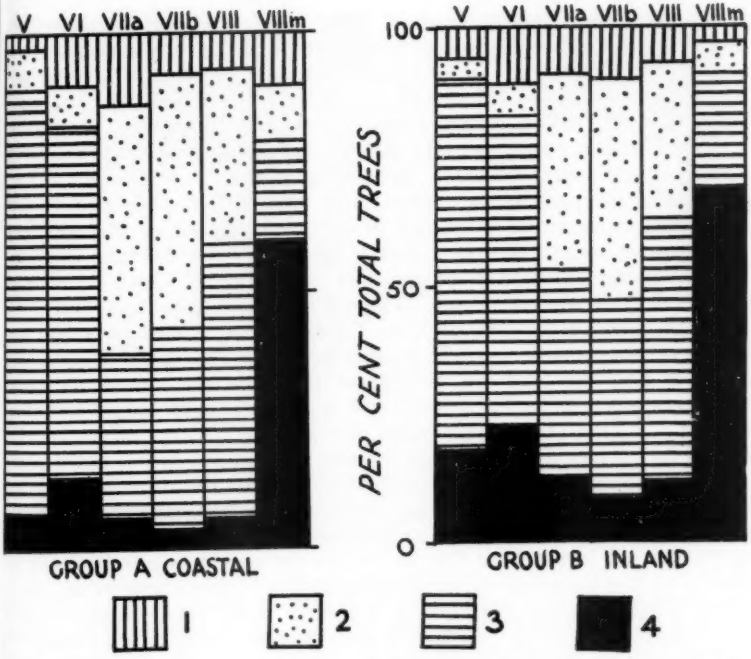


Fig. 4. Diagram showing proportion of trees in the total arboreal pollen for zones V-VIIIm. 1. Mixed oakwood (*Quercetum mixtum*); 3. Alder (*Alnus*); 3. Birch (*Betula*); 4. Pine (*Pinus*).

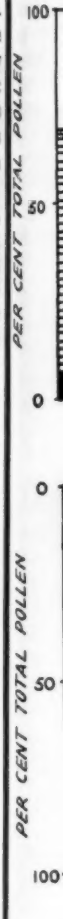
in the soil brought about by continuous leaching. Rainwater percolating through soil gradually dissolves and drains away mineral

salts which include most of the substances available for plant nutriment. Lime, which prevents soil from becoming sour is also carried away in solution so that there is a progressive deterioration of soil fertility bearing a direct relationship to rainfall.[5] During the sub-Atlantic period this process appears to have continued rapidly so that soils once suitable for vegetation demanding a relatively high base status and degree of fertility, *e.g.* oakwood, show features of podzolisation and now support heath and moorland.

Although allowance must be made for certain trees, such as pine, birch and alder, which are more prolific pollen producers than others, the composition of the forest may be deduced in a general way from the quantities of pollen representing the various trees in the total pollen count. Figure 4 illustrates this with separate diagrams for coastal and inland groups. A striking feature is the great rise of pine in zone VIII (modern) which is attributed to recent afforestation. Before this pine is throughout higher in group B than group A, due probably to the ancient Caledonian Forest which flourished particularly in highland habitats where its only remnants still survive, as at Rothiemurchus and Ballochbuie.

Both groups have abundant alder and birch which together dominate the arboreal species with alder reaching its maximum in the sub-Boreal and sub-Atlantic and birch its maximum in the Boreal. Mixed oak-wood which includes oak, elm, lime and beech (the two latter in negligible quantity) is never more than subsidiary. It shows maximal frequency in the late Boreal and Atlantic periods without any great difference between the coastal and inland groups. That oak was in the past by no means a rare tree in Buchan is proved by its consistent occurrence buried in the peat mosses of the district. Peter [6] gives details of tree remains found in some seventy Buchan mosses—many of them now cut over or reclaimed—and in nearly every one there was oak wood. These trees clearly grew to a considerable size ; measurements of three feet in diameter and forty feet in length of trunk before branching are recorded. The pollen frequency however does not lead one to suppose that oak was present in such profusion as the following quotation from Peter's paper would have us believe : " There can be no doubt the oak was the tree of that early period in Buchan and, under its friendly shelter, the birch, hazel and alder flourished apace." [7] If we allow for the fact that the oak is not a heavy producer of pollen and is therefore under-represented in pollen statistical work generally,[8] we must also bear in mind the high pollen counts for oak in southern Britain (where the species was indisputably common) and therefore expect a substantially higher count in an area where there is much evidence of a former wide distribution. Oak, however, in the north of Scotland is growing near the limit of its range [9] and as a result the production of mast is considerably lower than in southern Britain or France ; and it is suggested that pollen production is likewise considerably reduced.

The composition of the vegetation—trees and non-tree species together—is shown in Figure 5. Each species or group of species is represented by its percentage of total pollen excluding hazel. In zone



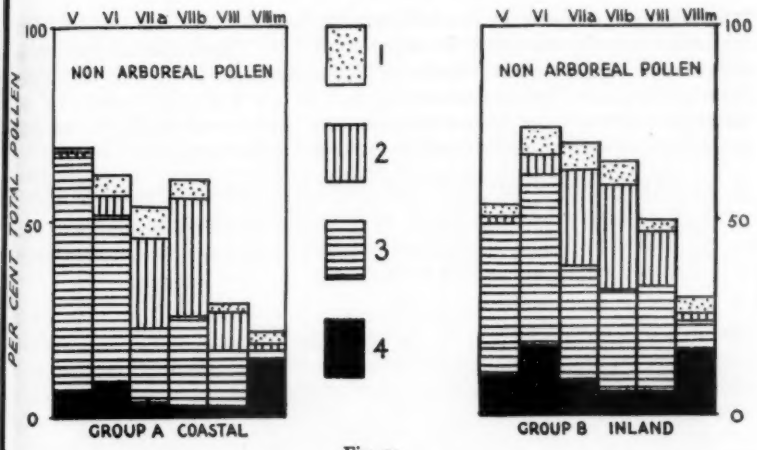


Fig. 5*a*

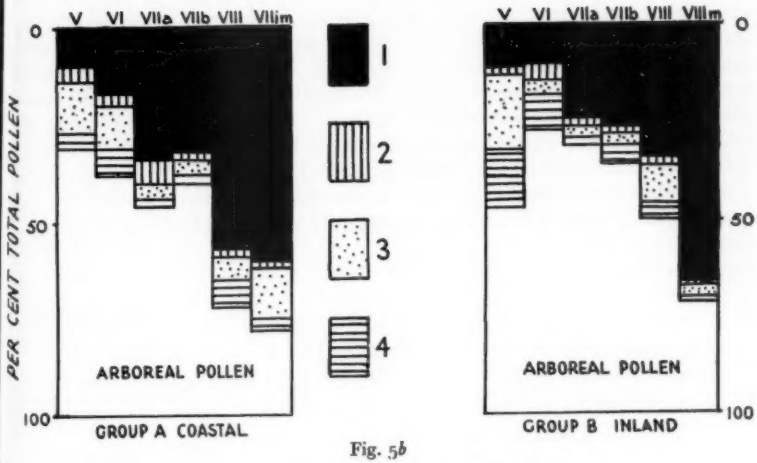


Fig. 5*b*

Fig. 5. Diagrams showing composition of total pollen (excluding hazel) :
5a. Arboreal pollen : 1. Mixed oakwood ; 2. Alder ; 3. Birch ; 4. Pine.
5b. Non-arboreal pollen : 1. Ericoid ; 2. Herbs (*Dicotyledenous*) ; 3. Grass (*Gramineae*) ; 4. Sedge (*Cyperaceae*).

VIII (modern) the arboreal pollen declines to only 22 per cent so that the apparent rise of pine is in fact largely a rise of proportion within a shrinking forest. In the inland area (group B) it is clear that pine was just as frequent in zone VI (Boreal) as at present, although it did not then account for so high a proportion of forest trees.

Much of the land of the north-east was at one time wet and swampy and judging from the pollen counts in the Atlantic and sub-Atlantic periods, supported a rich growth of alder. Tansley speaks of " . . . the flatter lowlands of post-glacial Britain as studded with lakes and meres

bordered by wide stretches of swamp, marsh and fen which were probably largely occupied by alderwood." [10] The rapid reduction of alder after the sub-Boreal (zone VIIb) may have been due to factors summarised by McVean as follows: ". . . not all aspects of an Atlantic climate are favourable to the alder, particularly as this becomes extreme. Unfavourable factors are listed below :—

1. Occurrence of late frosts after seed germination has taken place.
2. Incidence of strong winds at time of flowering.
3. Encouragement of leaching, podzolisation and the formation of raised bog and blanket peat. [11]

Pollen statistics reveal that there was a great reduction of alder in the sub-Atlantic and it may be that the above factors are mainly responsible but the activity of man must have had a considerable effect. The moist habitats in which alder flourishes would be less attractive to farmers than the drier ground occupied by birch and mixed oakwood, unless drainage were carried out. McVean describes the part man has played in the destruction of alder: "A period of drainage cultivation, cutting and burning then ensued in which the species suffered so severely that at the present-time it holds its own mainly as a river-side tree." [12] As with other activities of the agricultural pioneers one would expect to find evidence of it in the coastal plain before the landward area and this is indeed clearly seen in the pollen analyses. The coastal alder falls by 21 per cent from zones VIIb to VIII at the same time as inland alder falls by 14 per cent. The drop then becomes greater in the inland group showing 12 per cent lower in zone VIII (modern) than in zone VIII whilst the coastal group drops by only 7 per cent.

ZONES	VIIb	VIII	VIII (modern)
Group A (coastal)	30	9	2
Group B (inland)	28	14	2

TABLE 3.—ALDER PER CENT OF TREE POLLEN

The non-arboreal pollen frequencies appear in Figure 5b which shows a generally increasing preponderance of the Ericoid group indicating an extension of heath, moor or peat moss. This is perhaps surprising in view of the extensive reclamation, draining and removal of peat that has been carried out in north-east Scotland during the last two or three centuries.[13] [14] Stratigraphical evidence would appear to show that the Ericoid pollen has not come entirely or even mainly from the surface vegetation of the peat mosses, as the more recent peat (sub-Boreal and sub-Atlantic) is composed chiefly of Bog Moss (*Sphagnum spp*) and Cotton grass (*Eriophorum vaginatum*) with a little heather (see Fig. 2). It may be permissible then to consider the Ericoid pollen count as giving a rough and probably exaggerated indication of heath and moorland which extended at the expense of

woodland and in more recent times of deciduous woodland in particular. By destroying the forests to make way for grazing and cultivation the early inhabitants also cleared the way for an expansion of heath. This is seen in the diagrams where again the coastal expansion of Ericoids shows the influence of man in sub-Atlantic time (zone VIII) before such influence is discernible further inland where the great Ericoid expansion comes in the modern period.

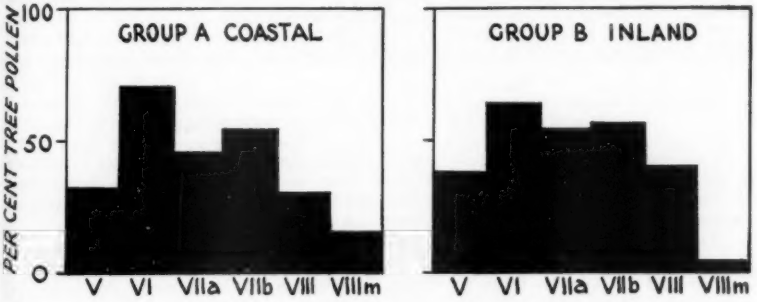


Fig. 6. Diagram showing pollen frequency of the shrub Hazel (Corylus avellana) expressed as a percentage of the tree pollen count.

Hazel pollen frequency (Fig. 6) shows the steep rise in the Boreal period (zone VI) known all over Western Europe as the 'Hazel Maximum'. This is followed by a reduction in the next zone but there is another small increase in zone VIIb (sub-Boreal). In the sub-Atlantic (VIII, VIII mod.) hazel decreases sharply to its lowest frequency for any period, a fact attributed mainly to intensive reclamation.

It is seen in the above survey how pollen statistics reflect vegetational changes which have in turn been brought about by changes in environment which was until the sub-Atlantic period governed by climatic factors. During the past one and a half millennia it is however clear that man has to an increasing degree taken over control from climate in influencing the extent and composition of the vegetation around him.

The author's thanks are due to Mrs E. M. Knox, D.Sc., of Edinburgh, for help with the pollen analysis of the Burreldale profile and to Miss M. Findlay of the Macaulay Institute for valuable assistance in the preparation of this paper. The pollen analysis of Strichen Moss[15] was done by the late Dr G. K. Fraser.

[1] Durno, S. E. Pollen Analysis of Peat Deposits in Scotland. *S.G.M.*, 1956, 72 (3), p. 181.

[2] Fraser, G. K. *Peat Deposits of Scotland*, Part I, D.S.I.R. Geological Survey of Great Britain : Scotland (Wartime pamphlet No. 36) 1943, p. 54.

[3] Childe, V. G. *The Prehistory of Scotland.* London, 1935, p. 265.

[4] Childe, V. G. *The Prehistory of Scotland.* London, 1935, p. 267.

[5] Pearsall, W. H. *Mountains and Moorlands.* London, 1950, p. 40.

[6] Peter, J. *The Peat Mosses of Buchan* (Appendix). The Club of Deir, 1876.

[7] Peter, J. *Op. cit.*, p. 31.

[8] Faegri, K. and Iversen, J. *Textbook of Modern Pollen Analysis.* Copenhagen, 1950, p. 87.

[9] Steven, H. M. The Forests and Forestry of Scotland. *S.G. M.*, 1951, 67 (2) : 111.

[10] Tansley, A. G. *The British Islands and their Vegetation.* Cambridge, 1953, p. 460.

[11] McVean, D. N. Ecology of Alnus glutinosa (L) Gaertn. VI Post Glacial History. *Jour. Ecol.*, 1956, 44 (2), p. 332.

[12] McVean, D. N. *Op. cit.*, p. 332.

[13] Greig, R. B. in *The Book of Buchan.* The Buchan Club, 1910, p. 437.

[14] Extract from *The Wilsons, A Banffshire Family of Factors*, privately printed by A. Baxendine & Sons, Edinburgh, 1936, quoted by Glentworth, R., in *The Soils of the Country Round Banff, Huntly and Turriff*, Memoirs of the Soil Survey of Great Britain. Edinburgh, H.M. Stationery Office, 1954, p. 115.

[15] Fraser, G. K. and Godwin, H. Two Scottish Pollen Diagrams : Carnwath Moss, Lanarkshire and Strichen Moss, Aberdeenshire. *New Phyt.*, 1955, 54.

GEOGRAPHY AT THE BRITISH ASSOCIATION

Geographers from all over Britain converged on Dublin for the 1957 meeting of the British Association, which was held from the 4th to the 11th of September. In fine weather Dublin provided a splendid backcloth to the meetings : the proceedings of Section ' E ' were held within the walls of Trinity College.

The programme opened in traditional fashion with a description by Mr J. P. Haughton (Head of the Trinity College Department of Geography) of the site of Dublin and its growth from its Norse foundation to the present day. Dr A. Farrington (Royal Irish Academy) then contributed an account of the Geomorphology of the Dublin region. These introductory lectures were illustrated by admirable excursions in and around Dublin. During the course of the week, longer excursions to the Wicklows, Leinster Chain and the Central Lowlands demonstrated the many aspects of the Irish scene.

The President of Section ' E ' for 1957, Professor D. L. Linton (Sheffield), delivered his presidential address on " The Everlasting Hills ". After reviewing the development of the theories of denudation chronology, he proceeded to show that the major relief features in the landscape, unless exhumed from an earlier cycle, are of Tertiary Age, and that in the areas of heavy precipitation during the Pleistocene Period, all the elements of the scenery have been considerably modified during that time. Professor Linton made a plea that in studies in geomorphology correlations be made from all the available evidence afforded by detailed field work rather than from selective field work based on cartographic studies. Other contributions to geomorphology concentrated on aspects of Ireland. Mr G. L. Davies (T.C.D.) contributed a statistical analysis of Irish erosion surfaces. Mr John B. Whittow (Londonderry) traced effects of the formation of the Irish Sea on the river systems of Southern Ireland. Mr N. Stephens (Belfast) discussed the evolution of the coastline of North Eastern Ireland, and Dr V. B. Proudfoot (Belfast) considered peat and peat soils in Northern Ireland.

The Geography of Ireland took a dominant place in the proceedings of Section ' E ', and the papers presented illustrated the importance of the historical threads in any understanding of the contemporary scene. Dr J. H. Andrews (T.C.D.) discussed the value of seventeenth century surveys in Ireland, Mr T. Jones-Hughes (University College, Dublin) utilised the agricultural returns published in the 1841 census to describe conditions in Leinster at the time of the famine, while Mr S. H. Cousens (Swansea) described the pioneer fringe from 1851-61. One of the most stimulating contributions to the Section was given by Mr R. H. Buchanan (Belfast) in a paper entitled " Rural Change in an Irish Townland 1980-1955 ". Mr Buchanan was able, after very detailed research, to show that social factors—a low marriage rate, and a high proportion of childless marriages, a result of the emigration of the more virile members of the community—were the causes of depopulation and union of holdings.

Mr T. W. Freeman (Manchester) contributed a paper entitled " Population Decline and Landscape Change in Rural Ireland since 1845 ", and showed the heavy emigration of the famine period made possible an increase in farm size, and stressed that landscape change has continued into the twentieth century with the break-up of the demenses by the Congested Districts Board and the Land Com-

mission. The sole Scottish contribution, a joint paper on " South Uist—A Scottish Congested District ", by Dr Joy Tivy and Dr J. B. Caird (Glasgow), showed that Land Resettlement Schemes have also brought about changes in the Scottish landscape.

If depopulation was stressed in many of the papers, Mr R. H. Lawton (Liverpool) described the location of the Irish-born population in Scotland, England and Wales during the 1841-61 period, and showed that harvest work and later the building of canals and railways were among the causes of Irish emigration before the famine, and that in the three successive census from 1841-61, 10 per cent. of the population of Lanarkshire and Renfrewshire were Irish born.

The theme of Under-Developed Countries was reflected in the Section ' E ' programme by papers from Dr M. M. Cole (North Staffordshire) on " The Savannahs of Brazil ", Mr P. Haggett (London) on Portugal, and Mr R. Mansell Prothero (Liverpool), who described the methods used in mapping population distribution and density in Northern Nigeria.

The 1958 meeting of the British Association will be held in Glasgow from the 27th August to the 3rd of September, when Professor E. Estyn Evans of Belfast will preside over Section ' E' .

J. B. CAIRD.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY TOURS 1957

The Honorary Secretary, Mr D. G. Moir again organised a most successful series of summer tours, five groups going in succession to Switzerland and Italy and one pioneering in Norway.

Each southern group flew by charter plane to Zurich and returned the same way a fortnight later. On the continent they enjoyed the comfort of a Deutsches Reise Buro bus and the competence and courtesy of their driver, now known to so many members simply as " Hans ". The route lay across the Alps from Luzern by way of the St Gotthard Pass to Lugano, with magnificent views of mountain and valley and an excellent cross-section of Switzerland. The Italian lakes with their shelter from the north offered welcome warmth and exuberant vegetation with exotic species in plenty on Isola Bella. The Plain of Lombardy formed another contrast with its rich cultures and wealthy cities, typified by Milan. Crossing the Po (one of the groups narrowly missing the floods), yet another widely different landscape was offered by the Mediterranean coast at Genoa, and a couple of days were spent nearby on the Italian Riviera. The coast was then followed to Pisa, with its famous monuments and Florence was the next centre, from which a rapid but profitable excursion was made by many to Rome. The Apennines were crossed to Bologna where lunch included sausages of that ilk and after crossing the orchards and flats of the Po delta the Euganean hills and Padova led to Venice. A short stay gave time for excursions to the Lido and other islands in the lagoon and most members succumbed to pressure and were serenaded in gondolas. The north side of the Lombardy plain was skirted by Verona to turn north by Lake Como to another crossing of the Alps, this time by the Maloja and Julian Passes, with a day at St Moritz from which many ascended by cable railway to the Piz Nair, reaching over 10,000 feet with good views of the nearby glaciers and of the Bernina and Upper Engadine. The Upper Rhine led north out of these mountains and after passing through the Principality of Liechtenstein, the route led by the Lake of Zurich back to the aerodrome.

Extensive as it was, the rapid changes of scene made the route of absorbing interest and of great value as a demonstration of the salient features of the geography of this part of Europe. Those members seeking straight tourism were able to visit a great many of the famous sights of Europe and those interested in the art of Italy had as much or more than could be digested in the time. Thanks to the organisation and to Hans there were no untoward incidents, the only hardship being the great heat of early July.

The object of the Norway tour was to achieve as much as possible in West Norway at a minimum cost. This the group of seventeen achieved by crossing from Newcastle to Bergen and basing themselves mainly on Kinsarvik in the upper Hardanger Fjord. This is magnificent fjord country with a variety of agricultural landscapes. Sorfjord,

a southerly arm of Hardanger Fjord is one of the few fruit-growing districts of Western Norway and Morello cherries, plums, pears and apples are more important in the farm economy than livestock. Visits were paid to farms to study conditions at first-hand and a whole day was devoted to the Aga Farm Community and Museum in company with a local horticultural expert. Another characteristic of West Norway, the hydro-electric installation, was visited at Tyssedal, but for those who took part, the highlight of the tour was the fifteen-mile walk up the Kinso valley and the overnight stay at Stavali tourist hut on the high plateau at 3,600 feet.

The return journey to Bergen was across the high plateau with glimpses of the Hardanger ice-cap. Three days were spent in Bergen, living at Fana Folk High School, an experience in itself. Bergen offered much of interest with its harbour, ancient Hansa merchant houses, fishery and shipping museums and the incomparable view from the hill-top at Floyen.

The tours were conducted by the following : 3rd June—Mr D. G. Moir ; 17th June—Mr J. Hossack ; 1st July—Mr J. B. Glen ; 15th July—Professor R. Miller ; 29th July—Mr A. MacPherson ; 5-20th July—Dr J. B. Caird (Norway).

R. M.

REVIEWS OF BOOKS

EUROPE

Trees, Woods and Man. By H. L. Edlen. 8¾×6¼. Pp. xv+272. 24 colour, 24 black/white plates. 2 figs. London : Collins (New Naturalist Series). 1956. 30s.

Under a title which summarises succinctly the scope of his book Mr Edlen sets out " to review the position of trees and forests in the life and landscape of Britain, from the standpoint of the inquiring layman rather than that of the professional forester ". That the result could be read with pleasure, interest and profit by both layman and professional is a tribute to the author's clarity of style and exposition as well as to his well-known familiarity with this subject. He provides yet another example in this series of how it is possible, at least in the natural sciences, to write clearly and intelligibly, with the minimum use of jargon, yet without sacrificing either scientific accuracy or detail.

The book is divided into three main sections. The first discusses the growth, structure and function of the tree as an individual plant, as a member of a forest community and as a valuable timber producer in relation to the physical and biological environment ; this leads naturally into a review of the establishment and composition of Britain's natural woodlands. This is the knowledge on which the production of a successful timber crop depends. The second section outlines the effect of man, from Neolithic hoe-cultivators up to the present day, by clearance and plantation, on the forests and, as a result, on the landscape of Britain. The last section is devoted to a series of short chapters on the distribution, uses and ecology of individual and groups of particular tree species common in this country. The whole is illustrated with a magnificent collection of plates, in colour and in black-and-white, of a standard which we have come to associate with and indeed expect of the New Naturalist Series.

It is perhaps a pity that the particular ' tabularised ' treatment of the last section —in contrast to the continuity and logical development of the first two—is inclined to result in two books in one. A more serious criticism, however, is that particularly in his second section not only in respect of the chapter on the Forestry Commission but also of those on the effect of man on woodlands through the ages Mr Edlen's book overlaps quite appreciably with the first part of Professor Stamp's book in the same series, on *Man and the Land.* Mr Edlen's comparable chapters gain, however, largely because his particular approach allows a greater measure of unity and continuity in the treatment of landscape evolution. Nevertheless a greater duplication of information than is necessary or desirable remains. While a parallelism between parts of the two books is admitted, the confession that they were written independently might well suggest that, in future, closer collaboration between authors in this series might be profitable.

J. T.

Seeing Roman Britain. By LEONARD COTTRELL. 9 × 6. Pp. 295. 59 plates. London : Evan Bros Ltd., 1956. 21*s.*

In *Seeing Roman Britain*, Mr Cottrell has turned away from the Mediterranean lands which formed the subject of his previous books of antiquarian travel and research, to explore the most remote province of that great Mediterranean power, Rome. He has journeyed for 3,500 miles over those parts of Roman Britain which were occupied by the Romans, following where possible the tracks of Roman roads. He has visited the remains of Roman towns, villas and amphitheatres in Southern Britain, the sites of Roman fortresses, forts and fortlets in Wales and Northern Britain, and the great barriers of Hadrian's Wall and the Antonine Wall, as well as museums containing Roman material.

The reader of this book will discover in it the less familiar features of Roman Britain, besides greeting afresh old favourites. He will be carried along by the impetus of the author's enthusiasm, overlooking with an indulgent eye small errors born of speed like the date of 112 A.D. assigned (p. 164) to Hadrian's Wall.

A. S. R.

AMERICA

The North American Midwest. Edited by JOHN H. GARLAND. 10½ × 7¾. Pp. vii+252, 80 figs. New York : John Wiley and Sons, Inc., London : Chapman and Hall Ltd., 1955. 64*s.*

Whilst this book will probably satisfy the reader who only wishes to refer to parts of its contents it seems equally possible that in its present form it will irritate the reader who covers its chapters consecutively.

Early in Part I the reader is informed that " emphasis is placed upon the dominant qualities of the various human, cultural and natural environmental associations ", and yet it is almost halfway through the book before population matters begin to receive anything like adequate attention! Again, in Part II, dealing with " Mid Western Elements " the approach generally tends to be excessively analytical ; only in the text on agriculture is there a satisfying account and a hard-hitting appraisal of human problems. In Part III the form of the chapters becomes rather tedious since each sub-region is described first in general, then in detail and then in summary. Part of this material would have formed a more useful chapter in Part II.

However in spite of its shortcomings this symposium does provide a considerable volume of welcome information about the Middle West, and in addition the illustrations by maps and diagrams are commendable. R. C.

California and The South-west. Edited by CLIFFORD M. ZIERER. 10½ × 7¾. Pp. x+376. Numerous figures and plates. New York : John Wiley and Sons, Inc. London : Chapman and Hall Ltd., 1956. $11.25.

California and the South-west is a symposium consisting of thirty-three regional essays by thirty-two authors, each a specialist in some aspect of the area. It is the third in a series of regional geographies published by John Wiley and Sons.

Because of the variety in approach and effectiveness of the contributors, one finds it most difficult to generalise about the book as a whole. Undoubtedly it is the most detailed and informative text on California and the South-western states written thus far. The first quarter is devoted to physical characteristics of the region. Perhaps the most outstanding contribution here is made by two oceanographers, from the Scripps Institute, on the ocean off the California coast. The author of the essay on weather and climate has chosen an unusual method of illustrating ' typical ' seasonal weather by the use of synoptic weather charts, which are explained in his text.

Cultural characteristics of the region occupy the remaining three-quarters of the book. Beginning with historical aspects and working through agriculture, natural resources, manufacturing, transportation, and population almost every dynamic feature is investigated. Again the difference in approach from one essay to the next becomes disturbing. For example, the author of the essay on the livestock industry not only recognises the effect of history, physical environment, and human use, but also reveals some pertinent statistical material. The fruit and nut industry on

the other hand is almost entirely concerned with verbal percentage analysis of production and marketing.

Perhaps the most outstanding feature of this book is the extensive use of oblique aerial photographs, which provide valuable insight into both urban and rural landscapes. Also noteworthy is the fact that three chapters are devoted to water, perhaps the most pressing problem in California and the South-west today.

A. H.

The Quest for Africa : Two Thousand Years of Exploration. By HEINRICH SCHIFFERS. Translated by DIANA PYKE. 9×6. Pp. 352. 3 maps. 28 plates. London : Odhams Press Ltd, 1957. 25*s*.

The publishers make the most extravagant claims for this book but it is in fact merely another collection of resumés of the work of explorers, scientists and adventurers in Africa. There is no sense of a connected story behind the snippets and the space devoted to each of them seems to be related more to their sensation-value than to their real importance. The great German Barth gets two pages to the adventurer Emir Pasha's chapter of forty-two. The disaster to Colonel Flattes is recounted at length, whereas Marshall Lyantey is not mentioned. Richardson is dealt with, but Thompson and Johnston are ignored. There are only three maps, all of Lake Victoria, and the half-tones are a curious collection.

The translation is for the most part excellent, but there are inexplicable lapses into near-slang e.g., " a hell of a row ", " darkie ", but on the other hand quite acceptable phrases are often excused by parentheses.

In spite of its faults the book has a certain value if only for the detail on explorers not normally dealt with in such books.

R. M.

Land Use Studies in the Transvaal Lowveld. By MONICA M. COLE. The World Land Use Survey. Occasional Papers No. 1. Edited by L. Dudley Stamp. London: Geographical Publications Ltd., 1956.

Our knowledge of the geography of Africa is still relatively poor. Broad outlines of many aspects are emerging but for the most part studies are more extensive than is desirable for a real understanding of the Continent. Small but intensive regional studies such as the present one are therefore most welcome : that it should appear under the aegis of the World Land Use Survey is appropriate enough for the region is almost exclusively an agricultural one. Against a background of soil and climatic studies there is an account of the various tree crops, mostly exotics, which are proving successful. Some interesting climatic relationships emerged and the general impression is one of a very encouraging development of crops which should conserve soil fertility. The repercussions with native agriculture and life are briefly touched upon. There is a useful bibliography and a series of outstandingly well reproduced land utilisation maps.

R. M.

ECONOMIC GEOGRAPHY

Location and Space-Economy. By WALTER ISARD. 9¼×6¼. Pp. xix+350. 57 figs. London : Chapman and Hall Ltd., 1956. 70*s*.

One of the leading American exponents of space-economics now presents us with the first of two volumes of a systematic treatment that should go far in assisting students to unwrap the wool from regional theory as well as to clarify many of the regional problems they meet in the field. The present volume is devoted to " general principles and constructs ".

The first chapters give us a critical summary of the approaches to regional theory —the historical and the more abstract Löschian or combined Thünen-Löschian-

Weberian approach. While the aggregative regional analysis used by von Thünen for agriculture and the analysis of Alfred Weber for a single industrial firm and a particular product are discussed in considerable detail throughout the volume, the work of Predöhl, Weigmann and Palander is also given particular attention in the introductory chapters. The general equilibrium theory and the theories of international trade and monopolistic competition are seen as special cases of the general theory of location and space-economy and so the work of Ohlin and Chamberlin is also considered. The chapter on some empirical regularities associated with distance, using as illustration such examples as the rank-size rule for cities, should attract some of the more chary newcomers to the possibilities of recognising a basic structure in the space-economy. There is repeated emphasis on transport inputs as " the very heart of location analysis ". The chapters on transport and labour orientations in the locational equilibrium of the firm, using the principle of substitution, may seem to some readers a rather laborious systematisation of the obvious. They end in a tripartite classification of location factors into transfer costs, agglomeration and deglomeration economies and a very miscellaneous group of factors considered by the author to vary independently of direction and distance. We then proceed to analysis of market and supply areas and of agglomeration (and deglomeration) economies. The interrelation of location and trade theories is discussed and the volume ends with a synthesis of production and flow patterns. Special mention must be made of the 58-page analytical subject-index in addition to the 3-page author-index.

In the succeeding volume the author hopes to develop operational models as tools for the more effective development of regional science and the handling of " the hierarchy of focal points and transport and communication routes " that makes up the space-economy. C. J. R.

World Sea Fisheries. By ROBERT MORGAN. 8¼×5¼. Pp. xiv+307. 16 Plates. 61 figs. London: Methuen and Co. Ltd., 1956. 20*s.*

One need not be a disciple of Malthus to recognise the significance of any study which promotes better understanding and explores the possibilities of enhancement of a food resource. Dr Morgan has placed the fish resource in its proper perspective by means of a threefold approach: 1. The Physical Environment. 2. Techniques and their World Distribution. 3. Fisheries of the World's Regions.

Productivity of the sea depends on a properly balanced physical and biotic environment, much the same as on land. However the importance of the controlling variables in the sea, i.e. temperature, currents, salinity, plankton, etc., are less completely known than those for the land. Dr Morgan synthesizes what little is known into a comprehensive account which clarifies some vital inter-relationships. On a basis of these observations the present distribution of important fishing-grounds is readily understood; moreover, through a brief discussion of the breeding and migratory habits of the important food fish, it becomes clear why certain species are associated with specific areas.

With the introduction of modern long-range fishing craft practising efficient methods of capture and on-board preservation, many advanced nations no longer depend on the small fishing port, which owed its existence to fishing-ground proximity. Nevertheless the bulk of the world's population is still supplied by fleets operating out of small ports close to fish supply; hence the importance of coastal zone physiography and consequent accessibility to markets.

The section on fisheries of the world's regions is most interesting. Low production may exist for a host of reasons, many of which are peculiar to specific areas. The rich fishing-grounds off the coast of Argentina are practically untouched by that country because high meat production lowers demand for fish; many African countries, in need of inexpensive protein added to their diet, underfish their coasts because inland transport is inadequate; India's coasts have been underfished at least in part because of the Hindu fear of sailing " beyond the green water ".

This is a valuable book and should be a welcome addition to any geography library. It is a must for those interested in conducting fishery studies. A. H.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

PROCEEDINGS

MEETINGS OF COUNCIL were held on 15th October and 10th December 1957.

ANNUAL GENERAL MEETING

THE ANNUAL GENERAL MEETING was held in the Society's Rooms in Edinburgh on 8th October, with the President in the Chair. The President reported another increase in the membership, with a new record total of 3,217.

The Annual Report of the Council and the Financial Statement for the year to 30th April 1957 were unanimously adopted.

The appointment of Dr Douglas A. Allan as President for a further period of one year was approved. The President thanked the retiring members of Council, and the following were elected :—

Members of Council : Stanley C. Brown, Ian G. Charleson, T. Laidlaw Collier, J. Y. Erskine, Miss K. M. McIver, Andrew C. O'Dell, J. Noel Phillipps, J. G. Ridland, George S. Russell, Harold Skelton, Sir John Storrar, and Arthur R. Wannop.

Lecture Convener : James Hossack.

The other Office-Bearers were re-appointed.

LECTURE SESSION 1957-1958

The following lectures were delivered :

EDINBURGH. *Usher Hall.*—Maynard M. Miller, PH.D., on " In Search of Wonders," on 17th October. Eric Hosking, F.R.P.S., M.B.O.U., on " Wild Spain," on 21st November. E. B. Worthington, M.A., PH.D., on " Africa 1927-1987," on 12th December. *Central Hall.*—Lt.Col. Niall Rankin, F.R.G.S., on " Big Game and Primitive Tribes of Equatorial Africa," on 23rd October. R. Maclagan Gorrie, D.SC., on " Soil Erosion Control in India," on 6th November. Miss Beryl Miles on " The Stars my Blanket," on 13th November. A. M. Kerr, M.B., CH.B., on " Glimpses in Colour of a Visit to the Holy Land," on 4th December. W. M. Mackinlay, J.P., on " A Journey to Ithica, by Jordan, Petra and the Aegean," on 18th December. *Society's Rooms.*—' Scottish Developments.' " A Geographical Approach to the Crofting Problem : with special reference to South Uist," by H. A. Moisley, B.SC., M.SC., and J. B. Caird, M.A., D. de L'UNIV., on 31st October. " Nature Conservation in Scotland," by Dr W. J. Eggeling, Dr D. N. McVean, and Dr J. D. Lockie, on 28th November.

GLASGOW. *St Andrew's (Grand) Hall.*—Maynard M. Miller, PH.D., on " In Search of Wonders," on 16th October. Eric Hosking, F.R.P.S., M.B.O.U., on " Wild Spain," on 20th November. E. B. Worthinton, M.A., PH.D., on " Africa—1927-1987," on 11th December. *St Andrew's (Berkeley) Hall.*—James Hossack, M.A., B.COMM., on " East African Journey," on 31st October. R. Maclagan Gorrie, D.SC., on " Soil Erosion Control in India," on 21st November. W. M. Mackinlay, J.P., on " A Journey to Ithica, by Jordan, Petra and the Aegean," on 19th December. *Royal Philosophical Society Hall.*—' Expert Opinion on Scottish Development and Problems '—" Fuel and Power in Scotland—Coal," by Robert A. Moore, O.B.E., B.SC., J.P., on 30th October. " Planning in the Clyde Valley," by Robert Grieve, M.P.T.I., A.M.INST.C.E., on 15th November.

ABERDEEN. *Y.M.C.A. Hall.*—Maynard M. Miller, PH.D., on " In Search of Wonders," on 14th October. Miss Beryl Miles on " The Stars my Blanket," on 11th November. Professor T. Neville George, D.SC., PH.D., D.-ES.-SC., on " New England to the Rockies," on 9th December.

DUNDEE. *Queen's College Hall.*—Maynard M. Miller, PH.D., on " In Search of Wonders," on 15th October. Miss Beryl Miles on " The Stars my Blanket," on 12th November. Professor T. Neville George, D.SC., PH.D., D.-ES.-SC., on " New England to the Rockies," on 10th December.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

REPORT OF COUNCIL

SEVENTY-THIRD SESSION, 1956-1957

(For the year 1st May 1956 to 30th April 1957)

The Council have the honour to submit the following Report :—

MEMBERSHIP

The changes during the Session are as follows :—

On the Roll at 1st May 1956		3137
New Members		769
		3906
Deduct by Death	21	
„ Resignation	668	
		689
On the Roll at 30th April 1957		3217

The fluctuation in the different categories of Membership at the four centres of the Society is analysed thus :—

	April 1956	April 1957		April 1956	April 1957
Edinburgh.			*Glasgow.*		
Life	266	269	Life	31	32
Ordinary	1208	1177	Ordinary	945	1028
Associate	40	28	Associate	3	9
Junior	50	45			
Corporate (Schools)	18	17	Corporate (Schools)	26	28
Aberdeen.			*Dundee.*		
Life	8	8	Life	3	3
Ordinary	321	308	Ordinary	87	146
Associate	1	—	Associate	1	—
Outside Area Members	113	104	*Honorary Members*	16	15

MEDAL AWARDS

The Livingstone Medal was awarded to Lt.-General Sir John Bagot Glubb, K.C.B., C.M.G., D.S.O., O.B.E., M.C., "for Outstanding Services in the Cause of Progress and Stability of the Arab World, 1921-1956."

The Research Medal was awarded to Gerald Roe Crone "for Work in the field of Cartography and on the History of Geography."

The Scottish Universities' Medals were awarded to :—W. D. McTaggart, St. Andrews University ; Hector Ralph Mackenzie, Aberdeen University ; Iseabel A. Glen, Glasgow University ; Janette Nisbet, Edinburgh University.

Fellowship of the Society

The Diploma of Fellowship was conferred upon :—(*a*) The Reverend Archibald Æneas Robertson, B.D. "for Special Services to the Society and to Scottish Topography" (1st May 1956); (*b*) James Barclay Glen, M.A., "for Special Services to the Society at the Glasgow Centre." (12th February 1957.)

1956 Summer Tours

During the summer of 1956 93 members took part in the tour to Austria and Yugoslavia, and 31 members in the tour to Switzerland and Northern Italy.

Meetings of the Society

The Society held fifty-six Meetings during the Session. In Edinburgh : seven Evening Lectures in the Usher Hall ; eleven Afternoon Lectures and one Evening Lecture in the Central Hall ; four Geographical Discussions in the Society's Rooms.

In Glasgow : seven Evening Lectures in the St. Andrew's (Grand) Hall ; six Afternoon Lectures and one Evening Lecture in the St. Andrew's (Berkeley) Hall ; four Geographical Discussions in the Philosophical Hall ; one Children's Hogmanay Film Show ; one Lecture Luncheon and the Annual Summer Excursion.

In Aberdeen and Dundee : six Evening Lectures. Lectures are currently listed in *The Scottish Geographical Magazine.*

The Scottish Geographical Magazine

Three issues, each of 64 pages, have appeared, with the usual number of half-tones and line blocks. The Council gratefully acknowledge a grant towards the cost of production received from the Carnegie Trust, and grants from the Universities of Southampton and London (Bedford College) towards illustrations. They also record their thanks to the contributors of original papers and reviews of books. The receipt of current publications from authors and publishers is likewise much appreciated.

Library and Map Department

Additions to Library :—285 books, of which 136 were purchased ; 10 pamphlets ; 4000 maps and charts. The Society is indebted to Dr. John Bartholomew for presentation of Volumes III and IV of *The Times Atlas.*

The Council thank those who have supported the Society with the presentation of books, maps, charts, lantern slides and films.

The Society's Representatives

The following Members were appointed to represent the Society on the bodies named :—

Bruce Memorial Prize Committee—Sir James M. Wordie, C.B.E. ; Patrick D. Baird.

Joint Committee for Anthropological Research and Training—Robert Kerr, O.B.E.

National Committee for Geography—Professor Andrew C. O'Dell.

National Trust for Scotland—Dr. John Bartholomew, M.C., J.P.

Permanent Committee on Geographical Names—John C. Bartholomew.

Scottish National Memorial to David Livingstone—Lt.-Col. John Johnston, O.B.E.

National Institute of Oceanography—Professor Ronald Miller.

Obituary

The Council regret the loss by death of Professor R. N. Rudmose Brown, Colonel J. M. Mackinnon, Miss Emma Hall Sawers, and S. C. Clapperton (Treasurer from 1946 to 1956).

INDEX

VOLUMES 72 AND 73 : 1956, 1957

Number of Volume is in deeper type.

Albert and Juliana: Two Great Waterways, by F. J. Monkhouse, **72**, 163.
Antarctica, International Activity in, 1955-56, **72**, 113.
Arable Area, The Expansion of the, by C. J. Robertson, **72**, 1.
Baird, P. D., and W. V. Lewis: The Cairngorm Floods 1956, **73**, 91.

Baulig, Henri: Europe and its Borderlands: A Review, **73**, 125.
Book Reviews. *See* Reviews of Books.
Border Floods, August 1956, The, by R. Common, **72**, 160.
Borders, The, **73**, 32.
British Association, 1956, Geography at, **72**, 188.
—— —— 1957, Geography at, **73**, 184.
Brown, Robert Neal Rudmose: Obituary, **73**, 123.

Cairngorm Floods 1956, The, by P. D. Baird and W. V. Lewis, **73**, 91.
Central Macedonia, Livestock and Forage Production in, by Anne Prentice, **73**, 146.
Certain Aspects of Vegetational History in North-East Scotland, by S. E. Durno, **73**, 176.
Changing World, The: A Review, by H. J. Fleure, **73**, 50.
Changes in the Geography of Trinidad, by Preston E. James, **73**, 158.
Chapman, G. T. L., and J. E. Waltham: Teesdale: A Transect Survey at School Level, **72**, 101.
Clapperton, S. C., *decd.*, **72**, 80.
Climatic Fluctuations and Fuel Requirements, by Gordon Manley, **73**, 19.
—— Observations in Scotland, by Cyril A. Halstead, **72**, 21.
Common, R.: The Border Floods, August 1956, **72**, 160.
Commonwealth Trans-Antarctic Expedition, **72**, 113.
Conservation of Nature, The International Union for the, **72**, 107.
Contributors to *S.G.M.*, **72**, 20, 84, 159; **73**, 34, 100, 145.
Cotton and Jute Industries of India, The, by William Kirk, **72**, 38.
Crone, Gerald Roe: Research Medal, **72** 128

Darling Downs, Pioneer Settlement on the, by L. J. Jay, **73**, 35.
Davis, G. L.: The Parish of North Uist, **73**, 65.
Drainage Pattern and Upland Surfaces of South-Central Wales, The, by R. J. Rice, **73**, 111.
Dunfermline and Kirkcaldy, The Textile Industries of, 1700-1900, by W. H. K. Turner, **73**, 129.
Durno, S. E.: Certain Aspects of Vegetational History in North-East Scotland, **73**, 176.
—— —— Pollen Analysis of Peat Deposits in Scotland, **72**, 177.

East, W. Gordon: An Eighteenth-Century Geographer: William Guthrie of Brechin, **72**, 32.
Errata *S.G.M.*, 73, No. 2, iii.
Europe and its Borderlands: A Review, by Henri Baulig, **73**, 125.
Exhibition of Maps. *See* Royal Scottish Geographical Society.
Expansion of the Arable Area, The, by C. J. Robertson, **72**, 1.
Elphinstone, The Rt. Hon. Lord, *decd.*, **72**, 64.

Fellowship. *See* Royal Scottish Geographical Society.
Fleure, H. J.: The Changing World: A Review, **73**, 50.
Floods, The Border, August 1956, by R. Common, **72**, 160.
—— The Cairngorm, 1956, by P. D. Baird and W. V. Lewis, **73**, 91.

Geography Appointments in Scottish Universities 1957, **72**, 96, **73**, 145.
—— at the British Association 1956, **72**, 188.
—— —— —— 1957, **73**, 184.
Geomorphology: South-Eastern England and Northern France: A Review, by J. B. Sissons, **72**, 53.
German Refugee Problem, The, Ten Years Restrospect, by Roy E. H. Mellor, **73**, 1.
Glaciation of North-East Scotland, The, by F. M. Synge **72** 129.

Glen, James Barclay: Fellowship, **73**, No. 2, iii.
Glubb, Lt.-General John Bagot (Glubb Pasha): Livingstone Medal, **72**, 127.
Greece, Re-afforestation in, by Anne Prentice, **72**, 25.
Guthrie, William, of Brechin: an Eighteenth-Century Geographer, by W. Gordon East, **72**, 32.

Haldane, Archibald Richard Burdon: Fellowship, **72**, 64.
Halstead, Cyril A.: Climatic Observations in Scotland, **72**, 21.
India, The Cotton and Jute Industries of, by William Kirk, **72**, 38.
International Activity in Antarctica, 1955-56, **72**, 113.
—— Geographical Congress, 1956, **72**, 187.
—— Geophysical Year, 1957-58, **72**, 115.
—— Union for the Conservation of Nature, The, **72**, 107.
Italies, A Mirror to all the,: A Review, by C. J. Robertson, **73**, 29.

James, Preston E.: Changes in the Geography of Trinidad, **73**, 158.
Jay, L. J.: Pioneer Settlement on the Darling Downs, **73**, 35.

Kirk, William: The Cotton and Jute Industries of India, **72**, 38.
—— —— The Primary Agricultural Colonisation of Scotland, **73**, 65.

Lecture Programme, 1955-56, **72**, 64, 128.
—— —— 1956-57, **72**, 190; **73**, 63.
—— —— 1957-58, **73**, 190.
Lewis, W. V. and P. D. Baird: The Cairngorm Floods, 1956, **73**, 91.
Livestock and Forage Production in Central Macedonia, by Anne Prentice, **73**, 146.
Livingstone Medal Awards, **72**, 127; **73**, 191.
Löschian Landscape, The, A Review, by C. J. Robertson, **72**, 81.

Mackinder's Heartland Concept, The U.S.S.R.: A Re-appraisal of, by Dennis R. Mills, **72**, 144.
Mackinnon, Colonel John McPhail, *decd.*, **73**, 63.
Manley, Gordon: Climatic Fluctuations and Fuel Requirements, **73**, 19.
Marginal Lands, Population Pressure and: A Review, by J. W. Watson, **72**, 117.
Mariner's Astrolabe: a Recent Scottish Find, **72**, 24.
Medal Awards. *See* Royal Scottish Geographical Society.
Mellor, Roy E. H.: The German Refugee Problem: Ten Years Restrospect, **73**, 1.
Migration Statistics, Scottish: A Note, by Richard H. Osborne, **72**, 153.
Miller, Ronald: Major-General William Roy, F.R.S., **72**, 97.
Mills, Dennis R.: The U.S.S.R.: A Re-appraisal of Mackinder's Heartland Concept, **72**, 144.
Mirror to all the Italies, A,: A Review, by C. J. Robertson, **73**, 29.
Moir, Donald G.: The Roads of Scotland: Statute Labour Roads, **73**, 101, 167.
Monkhouse, F. J.: Albert and Juliana: Two Great Waterways, **72**, 163.
Mungo Park Medal, **73**, opposite 144.

Newbigin Prize, **72**, 100, 162; **73**, 34.
North-East Scotland, The Glaciation of, by F. M. Synge, **72**, 129.
North Uist, The Parish of, by G. L. Davies, **72**, 65.

Osborne, Richard H.: Scottish Migration Statistics: A Note, **72**, 153.

Parish of North Uist, The, by G. L. Davies, **72**, 65.
Petroleum, The Shipment of, to and from the Ports of the United Kingdom, by Henry Rees, **72**, 109.
Pioneer Settlement on the Darling Downs, by L. J. Jay, **73**, 35.
Pollen Analysis of Peat Deposits in Scotland, by S. E. Durno, **72**, 177.
Population Pressure and Marginal Lands: A Review, by J. W. Watson, **72**, 117.
Primary Agricultural Colonisation of Scotland, The, by William Kirk, **73**, 65.
Prentice, Anne: Livestock and Forage Production in Central Macedonia, **73**, 146.
—— —— Re-afforestation in Greece, **72**, 25.
Proceedings of R.S.G.S., **72**, 64, 127, 190; **73**, 63, iii, 190.

Rae, Gordon: Scotland on the Map, **72**, 122.
Rattray: A Study in Coastal Evolution, by Kenneth Walton, **72**, 85.
Re-afforestation in Greece, by Anne Prentice, **72**, 25.
Rees, Henry: The Shipment of Petroleum to and from the Ports of the United Kingdom, **72**, 109.
Research Medal, **72**, 128.
Reviews of Books, **72**, 56, 123; **73**, 52, 186.
Rice, R. J.: The Drainage Pattern and Upland Surfaces of South-Central Wales, **73**, 111.
Roads of Scotland, The: Statute Labour Roads, by Donald G. Moir, **73**, 101, 167.
Robertson, The Rev. Archibald Aeneas: Fellowship, **72**, 128.

—— C. J.: The Expansion of the Arable Area, **72**, 1.
—— —— A Mirror to all the Italies: A Review, **73**, 29.
—— —— The Löschian Landscape: A Review, **72**, 81.
Royal Scottish Geographical Society—
Accounts, **73**, No. 3, ii-iii.
Annual General Meeting, **72**, 190; **73**, 190.
Annual Report, **72**, 191; **73**, 191.
Annual Subscriptions, **72**, 128.
Council, **72**, 64, 127, 190; **73**, 63, iii, 190.
Donations, **72**, 128.
Exhibition of Maps, **72**, 128.
Fellowship, **72**, 64, 128, 192.
Lectures, **72**, 64, 128, 190; **73**, 63, 190.
Livingstone Medal: Lt.-General Sir John B. Glubb, **72**, 127.
Medal Awards, **72**, 191; **73**, 191.
Membership, **72**, 191; **73**, 191.
Membership Subscriptions, Life, **72**, 128.
Mungo Park Medal, **73**, opposite 144
Newbigin Prize, **72**, 100, 162; **73**, 34.
Office Bearers, **72**, 190; **73**, 190.
Proceedings, **72**, 64, 127, 190; **73**, 63, iii, 190.
Research Medal: Gerald Roe Crone, **72**, 128.
Scottish Universities Medal, **72**, 191; **73**, 191.
Society's Representatives, **72**, 192; **73**, 192.
Summer Excursion, **72**, 128.
Tours, **72**, 128, 192; **73**, 185.

Sawyers, Miss Emma Hall, *decd.*, **72**, 127.
—— —— Donation, **72**, 128.
Scotland, Certain Aspects of Vegetational History in North-East, by S. E. Durno, **73**, 176.
—— Climatic Observations in, by Cyril A. Halstead, **72**, 21.
—— on the Map, **72**, 122.
—— The Glaciation of North-East, by F. M. Synge, **72**, 129.
—— The Primary Agricultural Colonisation of, by William Kirk, **73**, 65.
—— The Roads of, Statute Labour Roads, by Donald G. Moir, **73**, 101, 167.
Scottish Migration Statistics: A Note, by Richard H. Osborne, **72**, 153.
—— Universities Medal, **72**, 191; **73**, 191.
Shipment of Petroleum to and from the Ports of the United Kingdom, The, by Henry Rees, **72**, 109.
Sissons, J. B.: Geomorphology: South-Eastern England and Northern France: A Review, **72**, 53.
Synge, F. M.: The Glaciation of North-East Scotland, **72**, 129.

Teesdale: A Transect Study at School Level, by G. T. L. Chapman and J. E. Waltham, **72**, 101.
Textile Industries of Dunfermline and Kirkcaldy, The, 1700-1900, by W. H. K. Turner, **73**, 129.
Trinidad, Changes in the Geography of, by Preston E. James, **73**, 158.
Turner, W. H. K.: The Textile Industries of Dunfermline and Kirkcaldy, 1700-1900, **73**, 129.

U.S.S.R. The: A Re-appraisal of Mackinder's Heartland Concept, by Dennis R. Mills, **72**, 144.

Waltham, J. E. and G. T. L. Chapman: Teesdale: A Transect Study at School Level, **72**, 101.
Walton, Kenneth: Rattray: A Study in Coastal Evolution, **72**, 85.
Watson, J. W.: Population Pressure and Marginal Lands: A Review, **72**, 117

ILLUSTRATIONS

SCOTLAND

FACING PAGE

The Loch of Strathbeg. The coast of Aberdeenshire to the north and south of Rattray Head, according to Roy (1745-55), **72** 96
Finnart Oil Depot, Loch Long, **72** 112
Eyemouth Harbour: Flood damage, **72** 160
Eyemouth Harbour: Flood waters of the River Eye, **72** . . 160
Tay Valley, near Dunkeld, Perthshire, **72** 161
Leithen Water, Peebleshire, **73** . 32
Neidpath Castle, Tweed Valley, Peebleshire, **73** 32
Galashiels, **73** 33
Kelso, **73** 33
Great Cumbrae Island, Bute, **73** . 96
Glen Geusachan: Solifluction debris, **73** 96
Glen Geusachan: Ravine, **73** . 96
Beakers from Kincardineshire, **73** 97
Cramond Bridge, River Almond, **73** 97
Glasgow, showing medieval bridge, **73** 97
Kirkcaldy, **73** 145

INDIA

Collecting Cotton, Anand, Bombay, **72** 24
Jute Retting and Extraction, Barrackpore, Bengal, **72** . . 25

GREECE

FACINC PAGE

Mountains of Southern Greece, **72** 25

ANTARCTICA

Vahsel Bay—Weddell Sea, **72** . 113

BELGIUM

The Stein Coal-Port and the Juliana Canal, **72** 176

TRINIDAD

Pitch Lake, **73** 160
Maracas Bay, **73** 161
Banana Nursery, Centeno, **73** . 161

GENERAL

Mariner's Astrolabe 1555, **72** . 24
The Carluke Memorial to Major-General William Roy, Founder of the Ordnance Survey, **72** . 97
Photomicrographs of Pollen Grains, **72** 177
The Mungo Park Medal, **73** . 144

LECTURES

LECTURER	SUBJECT	
Anderson, Professor Mark.	Forestry in the Highlands	73, 64
Arnold, Guy.	The Oxford University Expedition to Borneo of 1955-56	73, 63
Baillie, J. C. N.	Hydro-Electricity in the Highlands	73, 64
Band, George.	Exploring the Land of the Incas	73, 64
Barnes, Patrick.	A Short Visit to Tokyo and Central Japan	73, 64
Campbell, J. G.	A Siamese Interlude	72, 64
Common, Robert.	So we went to Greece	73, 64
Eggeling, W. J., D. N. McVean, and J. D. Lockie.	Nature Conservation in Scotland	73, 190
Ellison, Mervyn.	Russia seen by a Scientist	72, 190
Feaver, Benjamin R.	The Rockies—their Birds and Flowers	73, 64
Fuchs, Vivian, and Sir Edmund Hillary.	The Trans-Antarctic Expedition, 1955-58	72, 128
George, Professor T. Neville.	New England to the Rockies	73, 190
Gibson, Lord.	Professional Personalities in Glasgow in the early Twentieth Century	72, 128
Glubb, Sir John Bagot. (Glubb Pasha).	The Jordan Desert and its Tribes	72, 190
Gorrie, R. Maclagan.	The Damodar Valley Scheme	72, 190
,, ,,	Soil Erosion Control in India	73, 190
Grieve, Robert.	Planning in the Clyde Valley	73, 190
Gunn, J. P.	Pakistan and India—Irrigation Problems	72, 190
Hall, J. M.	Israel—Old and New	72, 64
Hosking, Eric.	Wild Spain	73, 190
Hossack, James.	East African Journey	73, 190
Hotine, Martin.	Mapping the Blue	72, 190
Hutchison, Isobel W.	Edinburgh to John o' Groats—a Stroll	72, 190
James, Professor Preston E.	The Riddle of Empty Brazil	73, 63
Jones, Sydney H.	Ceylon—an Enchanting Island	73, 64
,, ,,	A South-Atlantic Cruise	72, 64
Kenyon, Ley.	Underwater Exploration	72, 64
Kerr, A. M.	Glimpses in Colour of a Visit to the Holy Land	73, 190
King, Professor Basil C.	A Journey to the Bechuanaland Protectorate	73, 64
Lowe, George.	The Trans-Antarctic Expedition, 1956-58	72, 191
Macdonald-Lockhart, S. F.	A Scottish Forester's Visit to Norway	72, 64
MacGregor, A. G.	Through Australia and New Zealand with a Mining Congress	72, 64
Mackinlay, W. M.	A Journey to Ithica, by Jordan, Petra and the Aegean	73, 190
Marshall-Cornwall, General Sir James	The Welsh Marches	73, 63
Miller, Maynard M.	In Search of Wonders	73, 190
Miller, N.	Mountains—European and American	72, 64
Miller, Professor Ronald.	Talking of Hills	73, 64
Miles, Beryl.	The Stars My Blanket	73, 190

LECTURER	SUBJECT	
Moisley, H. A., and J. B. Caird.	A Geographical Approach to the Crofting Problem: with special reference to South Uist	**73**, 190
Moir, Donald G.	The 1956 Tour to Northern Italy	**72**, 64, 190
Moore, Robert A.	Fuel and Power in Scotland—Coal	**73**, 190
Muir, Alex.	Soil Surveys and Land Developments in Africa	**73**, 64
Okorodudu, H. E. Chief M.E.R.	The Western Region of Nigeria	**72**, 64
Payne, Walter A.	Merging Cultures in Central America	**73**, 64
Rankin, Niall.	Big Game and Primitive Tribes of Equatorial Africa	**73**, 190
Read, Arthur H.	Climbing in the Karakoram	**73**, 64
Reith, George.	Italy	**73**, 64
Schacke, Eric.	Greenland	**72**, 64
Skrine, Sir Clarmont.	Iran Re-visited	**72**, 64, 191
Slack, Alfred.	Plant Discoveries in the Highlands of Scotland	**72**, 190
Stager, John K.	New Developments in Canada	**73**, 64
Stark, Elizabeth.	Scottish Women's Himalayan Expedition	**72**, 64, 190
Stark, Freya.	A Cruise along the South-West Coasts of Asia Minor	**72**, 64
Stirling, Sir John.	Rural Economy in the Highlands	**72**, 191
Tivy, Joy.	Discovering Galloway	**72**, 64
Urquhart, Sir Robert.	Highland Problems from a New Angle	**72**, 191
Watson, Professor J. Wreford.	Canada's Opening North	**72**, 64
Weir, Tom.	The High Atlas of Morocco	**72**, 64
Willis, J. C. T.	The Ordnance Survey and the Public	**72**, 64
Wimberley, Douglas Neil.	A Soldier's Travels	**73**, 64
Worthington, E. B.*	Africa 1927-1987	**73**, 190

REVIEWS OF BOOKS

United Kingdom

Alicella.	Averil Stewart	72, 61
British Moorlands, The.	John F. Hart	73, 52
Highlands in Colour, The.	W. S. Thomson	72, 56
Highlights of the Donegal Highlands.	H. P. Swan	72, 57
Making of the English Landscape, The.	W. G. Hoskins	72, 56
Man and the Land.	L. Dudley Stamp	72, 123
Origin and Distribution of the British Flora.	J. R. Matthews	72, 60
Ordnance Survey Annual Report, 1954-55, The		72, 63
Problem of the Picts, The.	F. T. Wainwright (ed. by)	72, 62
Rockall.	James Fisher	72, 124
Roman Britain.	I. A. Richmond	72, 62
Roman Roads in Britain: I. South of the Foss Way—Bristol Channel.	Ivan D. Margary	72, 62
Scotland.	G. S. Fraser and Edwin Smith	72, 57
Seeing Roman Britain.	Leonard Cottrell	73, 187
Soils around Jedburgh and Morebattle, The.	John W. Muir	73, 52
Structure, Surface and Drainage in South-East England.	S. W. Woolridge and D. L. Linton	72, 53
Trees, Woods and Man.	H. L. Edlin	73, 186

Europe

East Norway and its Frontiers.	Frank Noel Stagg	73, 53
Europe and its Borderlands.	Alan G. Ogilvie	73, 125
European Refugees.	Malcolm J. Proudfoot	73, 53
l'Italia nell'economia delle sue regioni.	Ferdinando Milone	73, 29
Plaines de Craie du Nord-Ouest du Bassin Parisien et du Sud-Est du Bassin de Londres et leurs Bordures.	P. Pinchmel	72, 53
Yougoslavie, La.	B. Z. Milojevic	73, 53

Africa

Land Use Studies in the Transvaal Low-veld.	Monica M. Cole	73, 188
Quest for Africa, The.	Heinrich Schiffers	73, 188
Southern Africa.	John H. Wellington	72, 57

America

Argentina.	George Pendle	72, 125
Bolivia.	Harold Osborne	72, 125
Brazil.	J. A. Camacho	72, 125
Brésil, Le.	Maurice Le Lannou	72, 126
California and the South-west.	Clifford M. Zierer (ed. by)	73, 187
Chile.	Gilbert J. Butland	72, 125

Colombia.	W. O. Galbraith	**72,** 125
Ecuador.	Lilo Linke	**72,** 125
Industrial Structure of American Cities, The.	Gunnar Alexandersson	**73,** 55
North American Midwest, The.	John H. Garland (ed. by)	**73,** 187
Paraguay.	George Pendle	**72,** 125
Urban Development in Southern Central Ontario, The.	J. Spelt	**72,** 124
Uruguay.	George Pendle	**72,** 125
Virginia at Mid-Century.	Jean Gottman	**72,** 59

Asia

Asia: Sketch Map and Exercise Books, Book VII.	Thomas Pickles	**73,** 55
Indian Climatology.	S. B. Chattergee	**73,** 54
Kanchenjunga.	John Tucker	**72,** 59
Land of the 500 Million: A Geography of China.	George B. Cressy	**72,** 124
Pakistani Way of Life, The.	I. H. Qureshi	**73,** 54
To the Third Pole.	G. O. Dyhrenfurth	**72,** 59

Australia

New Zealand Geomorphology.	C. A. Cotton	**72,** 60

Economic Geography

Chisholm's Handbook of Commercial Geography.	L. Dudley Stamp and S. Carter Gilmour	**73,** 59
Location and Space-Economy.	Walter Isard	**73,** 188
Pêche maritime et le Pêcheur en Mer, La.	Auguste Dupouy	**73,** 59
World Economic Geography.	Earl B. Shaw	**73,** 58
World Sea Fisheries.	Robert Morgan	**73,** 189

Cartography

Map and Photo Reading.	T. W. Birch	**73,** 56
Mapping the World.	Erwin Raiz	**73,** 57
Kartographie 1943-54, Die.	Hans-Peter Kosach and Karl-Heinz Meine	**72,** 60
Topographical Maps and Photographic Interpretation.	P. T. Silley	**73,** 56

Human Geography

Ingenieure Bauen die Welt.	Karl Krüger	**72,** 127
Migrations des peuples, Les.	Max Sorre	**72,** 127

Geology and Geomorphology

Bodenfrost als Morphologischer Faktor, Der.	Josef Schmid	**73,** 57
Geology and Ourselves.	F. H. Edmunds	**73,** 57
Introduction to Physical Geology.	Chester R. Longwell and R. Foster Flint	**73,** 57
Vocabulaire Franco-anglo-allemande de Geomorphologie.	Henri Baulig	**73,** 58

General

Changing World, The.	W. Gordon East and A. E. Moodie (ed. by) . . .	73, 50
Concise Glossary of Geographical Terms, A.	J. C. Swayne	73, 60
Guide to Earth History, A.	Richard Carrington . .	73, 61
Historical Geography.	J. B. Mitchell . . .	72, 62
Puzzle of the Past.	Ronald Jessup . . .	73, 61
Rome Beyond the Imperial Frontiers.	Sir Mortimer Wheeler . .	72, 62
Seasons Return.	John R. Allan . . .	72, 61
Worlds Beyond the Horizon.	Joachim G. Leithauser . .	73, 60

Atlases and Maps

Map of Roman Britain.	Ordnance Survey . . .	73, 62
New Map of the World: The Trystan Edwards Homolographic Projection.	B. T. Batsford Limited . .	72, 63
Penguin Atlas.	J. S. Keats (ed. by) . . .	73, 62
Oxford Home Atlas of the World, The.	Geoffrey Cumberlege . .	73, 62
Oxford Regional Economic Atlas of the U.S.S.R. and Eastern Europe.	Oxford: Clarendon Press London: Cumberlege . .	73, 63

INDEX PRINTED BY
HAY NISBET & CO. LTD.
73 DUNLOP STREET
GLASGOW, C.1

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

Patron

HER MAJESTY THE QUEEN

President

DOUGLAS A. ALLAN, C.B.E., D.SC., PH.D., F.R.S.E., F.R.S.G.S.

Vice-Presidents

*SIR HUGH MCPHERSON, K.C.I.E., C.S.I.
THE RIGHT HON. THE EARL OF ROSEBERY, K.T., P.C., D.S.O., M.C., F.R.S.E.
*J. CAMERON SMAIL, O.B.E., LL.D., F.R.S.E., F.R.S.G.S.
ROBERT GRANT, J.P., F.R.S.E.
JAMES RITCHIE, C.B.E., D.SC., F.R.S.E., F.R.S.G.S.
ARCHIBALD E. ROBERTSON, B.D., F.R.S.E., F.R.S.G.S.
ROLAND E. COOPER, F.R.S.E., F.R.S.G.S.
*DOUGLAS GUTHRIE, M.D., F.R.C.S.E., F.R.S.E.
*ARTHUR W. RUSSELL, O.B.E., W.S.
SIR ERNEST M. WEDDERBURN, O.B.E., D.L., D.SC., LL.D., F.R.S.E., F.R.S.G.S.
THE RIGHT HON. THE EARL OF SELKIRK, O.B.E., A.F.C.
*THE RIGHT HON. THE EARL OF WEMYSS AND MARCH, LL.D.
SIR EDWARD B. BAILEY, M.C., D.SC., LL.D., F.R.S., F.R.S.E., F.G.S.
*ALEXANDER HARRISON, C.B.E., C.A., F.R.S.G.S.
*JOHN JOHNSTON, O.B.E., T.D., M.A., F.R.G.S.
W. CLARK SOUTER, M.D.
HIS GRACE THE DUKE OF HAMILTON AND BRANDON, K.T., P.C., G.C.V.O., A.F.C., LL.D., F.R.G.S.
THE RIGHT HON. LORD BELHAVEN AND STENTON, F.R.G.S., F.R.C.A.S.
*JOHN BARTHOLOMEW, M.C., J.P., M.A., LL.D., F.R.S.E. F.R.G.S., F.R.S.G.S.
*MISS ISOBEL W. HUTCHISON, LL.D., F.R.S.G.S.

* *Serving on Council*

Chairmen of Centres

Glasgow : ALFRED JEFFERIES, M.A., M.LITT. *Dundee :* MISS I. A. TYRIE
Aberdeen : COLONEL M. M. CRUICKSHANK, C.I.E., B.SC., M.D., F.R.C.S., F.R.S.E.

Members of Council

As constituted 8th October 1957

Elected 1955

C. M. BECKETT, T.D., M.A.
J. B. BLACK
T. H. GILLESPIE
R. MACLAGAN GORRIE, D.SC.
MISS ELIZABETH D. GRAHAM
R. H. GUILD, M.A.
W. P. HALDANE, M.B.E., B.SC., M.INST.C.E.
J. G. HARLEY, M.A., F.R.S.G.S.
ROSS HIGGINS
R. K. MARTIN, M.A.(OXON.)
H. A. MAXWELL, B.A.(OXON.)
GORDON RAE, M.A.
MRS WINIFRED ROBERTSON
MISS CATHERINE P. SNODGRASS, M.A., PH.D.
SIR GEORGE WILLIAMSON, D.L., B.L.

Elected 1956

ALEXANDER DOUGLAS
IAN R. GRANT, B.A.
ROBERT G. INGLIS
ROBERT KERR, O.B.E., M.A.
MRS A. F. C. LAMONT, B.SC.(OXON.)
MRS K. L. MACGILLIVRAY
SIDNEY T. NEWMAN, M.A.(OXON.), HON.D.MUS. (DUNELM), F.R.C.O.
C. J. ROBERTSON, M.A., PH.D.
A. GRAHAM SERVICE, C.A.

Elected 1957

STANLEY C. BROWN, M.A.
IAN G. CHARLESON
T. LAIDLAW COLLIER
J. Y. ERSKINE, M.A., B.COMM., F.R.S.G.S.
MISS K. M. MCIVER, M.A., PH.D.
ANDREW C. O'DELL, M.SC.

J. NOEL PHILLIPPS, M.C., M.INST.T.
J. G. RIDLAND, O.B.E.
GEORGE S. RUSSELL, O.B.E., C.A., W.S.
HAROLD SKELTON
SIR JOHN STORRAR, C.B.E., M.C., LL.D.
ARTHUR R. WANNOP, O.B.E., B.SC.(AGR.), B.ENG.

Trustees—ROBERT GRANT, J.P.; D. ALAN STEVENSON, M.I.C.E., F.R.S.G.S.; JOHN BARTHOLOMEW, M.C., J.P., M.A., LL.D., F.R.G.S., F.R.S.G.S.

Hon. Treasurer—J. ALLAN BROWN

Joint Hon. Secretaries—DONALD G. MOIR, F.R.S.G.S.; JOHN C. BARTHOLOMEW, M.A., F.R.G.S.

Hon. Secretaries at Centres—
Glasgow : JAMES B. GLEN, M.A., F.R.S.G.S., 9 Queensberry Avenue, Clarkston.
Aberdeen : SIR GEORGE WILLIAMSON, D.L., B.L., 6 Union Row.
Dundee : MISS JESSIE C. NICOLL, 126 Ferry Road, Monifieth.

Hon. Map Curator—J. C. BARTHOLOMEW.

Hon. Editor—RONALD MILLER, M.A., PH.D., F.R.S.E.

Hon. Librarian—CHARLES A. MALCOLM, O.B.E., M.A., PH.D.

Lecture Convener—JAMES HOSSACK, M.A., B.COMM.

Treasurers—A. F. MORSE.
Glasgow : A. GRAHAM SERVICE, C.A., 73 Dunlop Street.

Auditor—GORDON G. RUFFLE, C.A.

Editor—MISS JOY TIVY, B.A., B.SC., PH.D.

Secretary—SQ.-LDR. BRIAN K. D. ROBERTSON, A.F.C., R.A.F.(RETD.)

SOCIETY'S ROOMS: SYNOD HALL, CASTLE TERRACE, EDINBURGH

TELEPHONE: EDINBURGH, FOUNTAINBRIDGE 7776.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

REVENUE AND EXPENDITURE ACCOUNT Year to 30th April 1957

REVENUE

1956			
	Subscriptions :—		
£3,553	Ordinary	£3,946	
204	Schools Corporate	69	
25	Junior Members	153	
—	Prepaid at 30/4/56	13	
			£4,181
£3,782			
	Life Membership Fees :—		
119	Proportion Applicable to Revenue		121
275	Government Grant		275
£4,176	*Total Ordinary Revenue*		£4,577
654	Excess of Expenditure over Income		901
£4,830			£5,478
£1,300	Dividends and Interest		£1,412

EXPENDITURE

1956				
	Magazine—Expenses of Publication :—			
£900	Printing	£1,191		
113	Editor	111		
139	Illustrations	215		
76	Wrappers, Index, Miscellaneous	99		
92	Postages	149		
£1,320			£1,765	
£268	*Less :*			
110	Current Magazines sold	£264		
100	Advertisements	168		
20	Grant from the Carnegie Trust	100		
	Sundry Small Grants	34		
£498			566	
£822				£1,199
	Rooms—Upkeep of :—			
£221	Rent, Rates, Insurance	£222		
72	Cleaning and Repairs	105		
65	Heating and Lighting	109		
28	Equipment and Furnishings	94		
£386			£530	
45	*Less :* Donations		46	
£341				484
£2,886	Lectures		£2,053	
1,403	*Less :* Tickets sold		534	
£1,483				1,519
1,301	Salaries and Honoraria			1,321
16	Audit Fees			16
281	Library : Purchase of Books and Maps		£224	
	Furnishings		69	
				293
216	General Printing			183
77	Stationery and Account Books			121
24	Medals			121
152	Postages and Telephone			96
117	Miscellaneous			125
£4,830				£5,478
£654	Excess of Expenditure over Revenue brought down			£901
—	Loss on Realisation of Investment			184
600	Provision for Depreciation and Amortisation			300
£1,254				£1,385
28	Surplus for the Year			97

1956			
	I. Reserves, etc. :—		
	Glasgow Equipment Fund	£60	

1956			
	I. Investments :—		
	£7,744 4% Consolidated Stock (1957 or after)	£7,208	
	£5,500 3½% Conversion Stock (1961 or after)	5,773	

1956				1956			
	I. Reserves, etc. :—				**I. Investments :—**		
	Glasgow Equipment Fund	£60			£7,744 4% Consolidated Stock (1957 or after)	£7,208	
	Provision for Current and Deferred Expenditure for Books, Maps, etc.	2,965			£5,500 3½% Conversion Stock (1961 or after)	5,773	
		£3,025			£5,604 3% Savings Bonds (1960-70)	5,523	
£3,026	*Add*—Early Magazine Sales	148			£4,106 3% Savings Bonds (1965-75)	4,174	
			£3,173		£3,000 British Electricity 3% Guaranteed Stock (1968-73)	2,944	
	II. Funds of the Society :—				£4,000 British Transport 3% Guaranteed Stock (1978-88)	3,783	
	(*a*) Life Membership Fund :—				£2,114 British Gas 3% Guaranteed Stock (1990-95)	2,120	
	Balance at 30th April 1956	£2,267			£50 Commercial Union Assurance Co. Ltd. Ordinary Stock	513	
	Sums Received during the year	148			500 Guardian Assurance Co. Ltd., 5s. Units Ordinary Stock	990	
		£2,415			£70 Royal Insurance Co. Ltd., Ordinary Stock	796	
2,267	*Less*—Sum Transferred to Revenue	121			400 North British and Mercantile Insurance Co. Ltd., Ordinary 5s. Shares	946	
			£2,294		2400 General Investors and Trustees Ltd., Ordinary 5s. Stock Units	1,092	
1,319	(*b*) Dr. J. G. Bartholomew Fund		1,319		£500 British Investment Trust Ltd., Deferred Stock	1,244	
27,739	(*c*) Ralph Richardson Bequest		27,739	£37,106	£100 First Scottish American Trust Ltd., Ordinary Stock	301	
	(*d*) General Fund :—						£37,407
2,483	Balance at 30th April 1956	£2,483		1,061	*Less*—Provision for Depreciation and Amortisation		1,361
	Add :			£36,045	(Market Value at 30th April 1957, £31,334) (1956, £30,904)		£36,046
608	J. E. Touche Bequest, now transferred	608		187	**II. Sundry Debtors**		120
	Legacy—Miss E. H. Sawers	100			**III. Cash in Bank and on Hand :—**		
	Surplus for the year	27			On Deposit Receipt	£1,450	
		3,218			On Current Account	141	
			34,570		On Hand	2	
122	III. Sundry Creditors		16				1,593
13	IV. Prepaid Subscriptions		—				
£37,577			£37,759	£37,577			£37,759

LIVINGSTONE MEDAL FUND

£1,909	Funds as at 30th April 1956	£1,940	£26	Expenses re Medals	£26
56	Income Received	59	1,865	Funds as at 30th April 1957	1,899
			74	Cash in Bank	74
£1,965		£1,999	£1,965		£1,999

DR M. I. NEWBIGIN MEMORIAL FUND

£512	Funds as at 30th April 1956	£527	£489	Funds as at 30th April 1957	£502
15	Income Received	16	38	Cash in Bank	41
£527		£543	£527		£543

Edinburgh 2. 10*th July* 1957.—I have examined the Accounts of the Royal Scottish Geographical Society for the year to 30th April 1957, of which the above are Abstracts, and compared them with the Vouchers and Instructions thereof, and I have found them to be correctly stated and sufficiently vouched and instructed.

GORDON G. RUFFLE, C.A., *Auditor.*

Meiklejohn

—Christmas

we have **atlases** for every age

why not give one this year ?

we also sell GLOBES

write for a full list to :

Meiklejohn & Son, 15 Bedford Street, London, W.C. 2

PICTURES OF BRITAIN'S PAST

The history of Britain can be studied with enhanced pleasure with the aid of the Ordnance Survey Period Maps :—

ROMAN BRITAIN

A map of Britain as it was during the period of Roman occupation (A D.43 to A.D. 410).

BRITAIN IN THE DARK AGES (*two sheets*)

Maps showing sites of historical importance between the departure of the Romans (A.D. 410) and the accession of King Alfred (A.D. 871).

MONASTIC BRITAIN (*two sheets*)

Maps covering the period of British Monasticism from the Norman Conquest (A.D. 1066) to the Dissolution of the Monasteries (A.D. 1539).

ANCIENT BRITAIN (*two sheets*)

Maps showing the most important visible antiquities older than A.D. 1066.

ORDNANCE SURVEY MAPS

Key to the land of Britain

Obtainable from most booksellers and stationers

PUBLISHED BY THE ORDNANCE SURVEY, CHESSINGTON, SURREY

Travellers' Cheques at Home

TRAVELLERS' CHEQUES, issued by The National Bank of Scotland, can be just as useful to you in this country as they are abroad. You can cash them at the branches of most Banks in the British Isles. Many hotels, restaurants and big London stores will accept them in payment of accounts. You can also pay fares with them at main railway stations.

In fact, when travelling, you will find National Bank Travellers' Cheques more convenient than your own cheques and safer than cash.

National Bank Travellers' Cheques are issued in units of £2, £5, £10 and £20, and may be obtained from any branch, whether you are a customer of the Bank or not.

THE

NATIONAL BANK OF SCOTLAND

LIMITED

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

List of current Publications in the Library : Part I

(Only bound volumes can be borrowed by Members.)

Geographical Journal, *London*
Geographical Magazine, *London*
Geography, *London*
Institute of British Geographers : Transactions, *London*
Journal of the Manchester Geographical Society, *Manchester*
Irish Géography, *Dublin*
Canadian Geographical Journal, *Ottawa*
Revue Canadienne de Géographie, *Montreal*
Cahiers de Géographie de Quebec, *Quebec*
Royal Geographical Society of Australasia : Proceedings, *Adelaide*
Australian Geographer, *Sydney*
New Zealand Geographer, *Christchurch*
National Geographical Journal of India, *Banaras*
Bulletin of the National Geographical Society of India, *Banaras*
Bombay Geographical Magazine, *Bombay*
Geographical Review of India, *Calcutta*
Indian Geographical Journal, *Madras*
Indian Geographer, *New Delhi*
Pakistan Geographical Review, *Lahore*
Bulletin of the Ceylon Geographical Society, *Colombo*
Journal of Geography, *Chicago*
Annals of the Association of American Geographers, *Lawrence, Kansas*
Current Geographical Publications, *New York*
Geographical Review, *New York*
Economic Geography, *Worcester, Mass.*
Acta Geographica, *Paris*
Annales de Géographie, *Paris*
Bibliographie Mensuelle, *Paris*
Revue de Géographie Alpine, *Grenoble*
Revue de Géographie de Lyon, *Lyons*
Société Languedocienne de Géographie : Bulletin, *Montpellier*
Die Erde, *Berlin*
Erdkunde, *Bonn*
Kölner Geographische Arbeiten, *Cologne*
Petermanns Geographische Mitteilungen *Gotha*
Mitteilungen der Geographischen Gesellschaft, *Hamburg*
Jahrbuch der Geographischen Gesellschaft, *Hanover*
Heidelberger Geographische Arbeiten, *Heidelberg*
Wissenschaftliche Veröffentlichungen des Deutschen Instituts für Länderkunde *Leipzig*
Frankfurter Geographische Hefte, *Frankfurt*
Mitteilungen des Geographischen Instituts der Martin-Luther-Universität Halle-Wittenberg, *Halle-Wittenberg*
Schriften des Geographischen Instituts der Universität Kiel, *Kiel*
Müncher Geographischhe Hefte, *Munich*
Westfälische Geographische Studien, *Munster*
Würzburger Geographische Arbeiten, *Wurzburg*
Mitteilungen der Geographich-Ethnologische Gesellschaft, *Basel*
Bulletin de la Société Neuchateloise de Géographie, *Neuchatel*

(*Continued on facing page*)

LIST OF CURRENT PUBLICATIONS IN THE LIBRARY: PART I

International Geographical Union Newsletter, *Zurich*

Mitteilungen der Geographischen Gesellschaft, *Vienna*

Geographischer Jahresbericht aus Oesterreich, *Vienna*

Wiener Geographische Schriften, *Vienna*

Rivista Geografica Italiana, *Florence*

L'Universo, *Milan*

Memorie di Geografia Economica, *Naples*

Bolletino della Societa Geografica Italiana, *Rome*

Annali di Ricerche e Studi di Geografia, *Genoa*

Estudios Geograficas, *Madrid*

Sociedade de Geografia de Lisboa: Boletim, *Lisbon*

Bulletin de la Société Royale Belge de Géographie, *Brussels*

Koninklijk Nederlandsch Aardrykskundig Genootschap, *Leiden*

Geografisk Tidsskrift, *Copenhagen*

Kulturgeografi, *Copenhagen*

Norsk Geografisk Tidsskrift, *Oslo*

Geografiska Annaler, *Stockholm*

Ymer, *Stockholm*

Svensk Geografisk Arsbok, *Lund*

Acta Geographica, *Helsinki*

Fennia, *Helsinki*

Geograficky Casopis, *Bratislava*

Sbornik Ceskoslovenske Spolecnosti Zemepisne, *Prague*

Przeglad Geograficzny, *Warsaw*

Czasopismo Geograficzne, *Warsaw*

Foldrajzi Kozlemenyek, *Budapest*

Bulletin de la Societe Serbe de Geographie, *Belgrade*

Geografiski Glasnik, *Zagreb*

TWO POPULAR SERIES

Colonial Reports

Published annually for the larger territories and biennially for the smaller ones, this series provides detailed information about the prevailing social, economic, and geographical conditions of each territory in a compact and readable form. Each report is illustrated with photographs and a map. Recent issues include :

Cyprus, 1956 **5s. 6d.** (*post 8d.*)
Kenya, 1956 **7s. 6d.** (*post 7d.*)
Nyasaland, 1956 **5s. 6d.** (*post 6d.*)

Overseas Economic Surveys

Designed primarily for the use of the businessman, this important series gives an insight into the economic and commercial conditions in more than fifty foreign countries. They contain such a wealth of information as to become indispensable to anyone wishing to study a country in some detail, and are, therefore, of particular value to the geography student. Recent additions are :

Austria (February 1957) **4s. 6d.** (*post 5d.*)
Dominican Republic (February 1957) **2s. 3d.** (*post 4d.*)
Spain (October 1956) **8s.** (*post 9d.*)

HMSO

13a Castle Street, Edinburgh 2
or through any bookseller

BANK OF SCOTLAND

established 1695

Wherever you may be in Scotland
you will find nearby
to welcome you
a Branch of

SCOTLAND'S FIRST BANK

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

LIBRARY ADDITIONS—LIST I—JANUARY TO JULY 1956

SECTION A. REFERENCE BOOKS AND GUIDE BOOKS

Class Number	*Author*	*Title*
120	Brown, A. Gordon	Yearbook and Guide to Southern Africa.
120	Brown, A. Gordon	Yearbook and Guide to East Africa.
129	Quinn, D. B.	The Roanoke Voyages, 1584-1590 (Hakluyt Society).
130		100th Annual Report of the Registrar-General for Scotland.
131		Whittaker's Almanack, 1956.
132		New Zealand Official Yearbook, 1955.
140		Atlas of Australian Resources.
140	Penguin Books	The Penguin Atlas of the World.
140	Schuchert, C.	Atlas of Palaeogeographical Maps of North America.
140		Oxford Regional Economic Atlas of the U.S.S.R. and Eastern Europe.
163	Boehle, B.	Handy Guide to Western Germany.
166	Fodor, Eugene	Austria, 1956 ; Benelux, 1956 ; France, 1956; Germany, 1956 ; Great Britain and Ireland, 1956 ; Italy, 1956 ; Scandinavia, 1956 ; Spain and Portugal, 1956 ; Switzerland, 1956.
169	Baddeley, M. J. B.	The Lake District.
171	Muirhead, L. R.	Rome and Central Italy.
179	Nagel Travel Guides	Brazil ; Germany ; Iceland.

SECTION B. GENERAL

183	Lindsay, M.	The Lowlands of Scotland.
184	Hawkins, D.	Sedgemoor and Avalon.
203	Nock, O. S.	The Railway Engineers.
211	Harrison, D.	Along Hadrian's Wall.
212	Collingwood, W. G.	The Lake Counties.
220	Atkinson, R. J. C.	Stonehenge.
231	Hayward, R.	Mayo, Sligo, Leitrim and Roscommon.
242	Grant of Rothiemurchus, Elizabeth	Memoirs of a Highland Lady.
263	Docharty, W. McK.	A Selection of Some 900 British and Irish Mountain Tops.
263	Weir, Thomas	Highland Days.
264	Mould, D. D. C. Pochin	West Over Sea.
266	Venables, U.	Life in Shetland.
278	Kirk, R.	St. Andrews.
293	Christie, G.	Harbours of the Forth.
302	Leithauser, J. G.	Worlds Beyond the Horizon.
307	Le Toumelin, J. Y.	Kurun Around the World.
307	Willis, W.	The Epic Voyage of the Seven Little Sisters.
307	Davison, A.	My Ship is so Small.
307	Robinson, W. N.	Deep Water and Shoal.
308	Cornet, J. & Lochan, N.	Journey to the Land of Fire.
309	Ullman, J. R.	The Age of Mountaineering.
312	Hass, H.	Diving to Adventure.
350	Newman, B.	Still Flows the Danube.
352	Gibbons, R.	Coming Down the Seine.
355	Brion, M.	Provence.
365	Stagg, F. N.	East Norway and its Frontiers.

Class Number	*Author*	*Title*
379	Rebuffat, G.	Starlight and Storm.
380	Ogrizek, D.	Italy.
380	Whelpton, E. & B.	Summer at San Martino.
382	Lucas, E. V.	A Wanderer in Rome.
387	Hogg, G.	Portuguese Journey.
387	Salter, C.	Introducing Portugal.
387	Younger, W. & E.	Blue Moon in Portugal.
390	Hodgkinson, H.	The Adriatic Sea.
391	Mais, S. P. B.	Majorcan Holiday.
392	King, F.	Introducing Greece.
394	Rhodes, A.	Where the Turk Trod.
399	Rothery, A.	Iceland, Bastion of the North.
399	Fisher, J.	Rockall.
401	Gunther, J.	Inside Africa.
401	Seymour, J.	One Man's Africa.
401	Courlander, K.	I Speak of Africa.
413	Ojike, M.	My Africa.
417	Tregenza, L. A.	The Red Sea Mountains of Egypt.
425	Anstruther, I.	I Presume.
452	Bosanquet, M.	Canada Ride.
461	Darling, F. Fraser	Pelican in the Wilderness.
477	Blomberg, R.	The Naked Aucas.
500	Skrede, W.	Across the Roof of the World.
500	Rawicz, S.	The Long Walk.
502	Seargent, P.	Another Road to Samarkand.
515	Mason, K.	Abode of Snow.
515	Hillary, Sir E. & Lowe, G.	East of Everest.
515	Bauer, P.	The Siege of Nanga Parbat.
518	Lyon, J.	Just Half a World Away.
519	Qureski, I. H.	The Pakistani Way of Life.
522	Mannin, E.	Land of the Crested Lion.
591	Walton, E. W. Kevin	Two Years in the Antarctic.
591	Mountevans, Admiral Lord	The Antarctic Challenge.
591	Robertson, R. B.	Of Whales and Men.
592	Mikkelsen, E.	Mirage in the Arctic.
592	Rowley, D.	Arctic Research.
653	Gunther, K. & Deckert, K.	Creatures of the Deep.
654	Carson, R.	The Edge of the Sea.
670	White, A. T.	Adventures in Archaeology.

SECTION C. TEXT BOOKS

801	Van Loon, H.	The Home of Mankind.
805	Birch, T. W.	Map and Photo Reading.
805	Silley, P. T.	Topographical Maps and Photographic Interpretation.
807	Monkhouse, F. J.	Principles of Physical Geography.
807	Beckinsale, R. P.	Land, Air and Ocean.
813	Carrington, R. A.	A Guide to Earth History.
821	Cotton, C. A.	New Zealand Geomorphology.
821	Schmid, J.	Der Bodenfrost als Morphologischen Faktor.
848	Chatterjee, S. B.	Indian Climatology.
849	Azzi, G.	Agricultural Ecology.
857	Klimm, L. E., Starkey, O. P., Russell, J. A., English, V. H.	Introductory Economic Geography.
860	Pedler, F. J.	Economic Geography of West Africa.
865	Morgan, R.	World Sea Fisheries.
878	Garland, J. H.	The North American Midwest.
881	Buchanan, K. M. & Pugh, J. C.	Land and People in Nigeria.
900	Creek, F. N. S.	Geography for Boys and Girls.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

LIBRARY ADDITIONS—LIST 2—AUGUST 1956 TO JANUARY 1957

SECTION A. REFERENCE BOOKS AND GUIDE BOOKS

Class Number	*Author*	*Title*
120	Brown, A. Gordon	Yearbook and Guide to East Africa.
120	Brown, A. Gordon	Yearbook and Guide to South Africa.
131		Britain, an Official Handbook, 1956.
132		101st Report of Registrar-General for Scotland.
132		Canada, 1956.
132		Denmark, 1957.
132		New Zealand Official Yearbook, 1956.
132		Education Authorities' Directory.
140	Grollenberg, L. H.	Atlas of the Bible.
140		Philip's Modern School Atlas.
140		The Faber Atlas.

SECTION B. GENERAL

196	Edlin, H. L.	Trees, Woods and Man.
197	Young, A.	A Prospect of Britain.
197	Wilson, F.	Strange Island
201	Cottrell, L.	Seeing Roman Britain.
203	Strong, L. A. G.	The Rolling Road.
210	Seymour, J.	Sailing Through England.
210	Rodgers, J.	English Rivers.
222	Dixon-Scott, J.	The Channel Islands.
230	Sutherland, H.	Irish Journey.
242	Innes, Sir Thomas	Scots Heraldry.
246	Thomson, W. S.	Colourful Scotland.
262	Trent, C.	Motorist's Companion on the Highways of Scotland.
281	Reid, J. M.	Glasgow.
301	Bruce, Sir Michael	Tramp Royal.
301	Russell, Sir E. John	The Land Called Me.
307	Van de Wiele, A.	The West in My Eyes.
307	Johnson, I. & E. & Edes, L.	Yankee's People and Places.
307	Sellman, R. R.	The Vikings.
308	Pape, R.	Cape Cold to Cape Hot.
309	Jackson, M. & Stark, E.	Tents in the Clouds.
309	Evans, C.	On Climbing.
309	Underhill, M.	Give Me the Hills.
311	de Lavour, G.	Caves and Cave Diving.
312	Huout, G. & Willm, P.	2,000 Fathoms Down.
360	Bon Viveur	Holiday in Holland.
360	King, G.	The Land and People of Holland.
361	Miles, B.	Attic in Luxembourg.
374	Gedye, G. E. R.	Introducing Austria.
375	Halass, Z.	Hungary.
378	Ogrizek, D.	Switzerland.
380	Whelpton, E. & B.	Grand Tour of Italy.
380	Sandwith, F.	Camera and Chianti.
380	Kubly, H.	Stranger in Italy.
382	Labande, Y. & E.	Rome.
384	Kay, E.	Isles of Flowers.
386	Epton, N.	Grapes and Granite.
387	Blakestone, O.	Portuguese Panorama.
392	Pollard, J.	Journey to the Styx.
401	Berrier, J.-C. & Derizet, R.	The High Places of Africa.

Class Number	*Author*	*Title*
401	Haines, R.	Africa, Land of Contrasts.
402	Potts, W. H.	The Sand and the Snow.
417	Rowlatt, M.	A Family in Egypt.
422	Riddell, J.	African Wonderland.
452	Kenton, E.	Black Gowns and Redskins.
457	de Coccolla, R. & King, P.	Ayorama.
457	Berton, P.	The Mysterious North.
461	Creasy, J.	Let's Look at America.
478	von Hagen, V.	Highways of the Sun.
480	Korabiewicz, W.	Matto Grosso.
480	Caspar, F.	Tupari.
483	Ferlet, R. & Poulet, G.	Aconcagua South Face.
500	Shor, J. B.	The Trail of Marco Polo.
505	Kinross, Lord	Europa Minor.
505	Liddell, R.	Byzantium and Istanbul.
508	Barton, L.	Land of Promise.
515	Buhl, H.	Nanga Parbat Pilgrimage.
515	Evans, C.	Kangchenjunga The Untrodden Peak.
519	Band, G.	Road to Rakaposhi.
524	Blake, W. T.	Thailand Journey.
525	Macdonald, M.	Borneo People.
530	von Nebesky-Wojkowitz, R.	Where the Gods are Mountains.
531	Patterson, G.	God's Fool.
536	Werner, E. T. C.	Myths and Legends of China.
539	Price, W.	Journey by Junk.
550	Hope, S.	Diggers' Paradise.
583	Danielsson, B.	Life and Work on Raroia.
591	Migot, A.	The Lonely South.
591	Gibbons, R.	An Evaluation of the Cook-Peary Controversy.
592	Marshall, R.	Arctic Wilderness.
592	Wilkinson, D.	Land of the Long Day.
592	Freuchen, P.	Ice Floes and Flaming Water.
592	Malaurie, J.	The Last Kings of Thule.
592	Stacpoole, E.	The Voyage of the Heron and the Huntress.
650	Stuart, F.	A Seal's World.
653	Fisher, J.	Adventure of the Sea.

SECTION C. TEXT BOOKS

805	Raisz, E.	Mapping the World.
805	Lobek, A. K.	Things Maps Don't Tell Us.
805	Ristow, W. W.	Aviation Cartography.
821	Thornbury, W.	Principles of Geomorphology.
822	Cressy, G.	Land of the 500 Million.
848	H.M.S.O.	The Weather Map.
849	Haden-Guest, S.	A World Geography of Forest Resources.
857	Ellacott, S. E.	Spinning and Weaving.
858	Darby, H. C.	The Draining of the Fens.
869	East, G. & Moodie, A.	The Changing World.
872	Wooldridge, S. W.	The Geographer as Scientist.
873	Saxebly, C. H.	A Geographer's Reference Book.
875	Kish, G.	An Introduction to World Geography.
876	Kinnear, W. & Wright, G.	Our Scotland.
876	Miller, T. G.	Geology and Scenery in Britain.
876	H.M.S.O.	The Soils Around Kilmarnock.
878	Zierer, C. M.	California and the Southwest.
880	Cumberland, K. B.	Southwest Pacific.
881	Fitzgerald, W.	Africa.
882	Shabad, T.	China's Changing Map.
900	Hobbs, J. S.	General World and Regional Geography.

OF MICHIGAN

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

LIBRARY ADDITIONS—LIST 3—JANUARY TO JULY 1957

SECTION A. REFERENCE BOOKS AND GUIDE BOOKS

Class Number	*Author*	*Title*
129	Letts, Malcolm	The Travels of Leo of Rozmital (Hakluyt Society).
130		Guide to the International Geophysical Year.
132		New Zealand Official Yearbook, 1957.
140		Weltatlas—die Staaten der Erde und ihre Wirtschaft.
163	Hachette World Guides	Israel; Portugal, Madeira, Azores.
166		Austria, 1957; France, 1957; Germany, 1957; Italy, 1957; Scandinavia, 1957; Spain and Portugal, 1957; Switzerland, 1957.
168	Ward Lock's Red Guides	Edinburgh and District; Glasgow; Harrogate; Highlands of Scotland; Inverness; Northern Scotland; Oban; Penzance; Ripon; St. Ives; South Wales; Tenby; The Lake District; The Yorkshire Dales; West Cornwall; Western Scotland.
171	Muirhead, L. Russell	Blue Guide to Scotland.
179	Nagel Travel Guides	Canada.

SECTION B. GENERAL

182	Robbins, Michael	Middlesex.
182	Hoskins, W. G.	Devon.
210	Wightman, Ralph	Rural Rides
225	Lang, Theo (ed.)	The Border Counties.
227	Davies, Elwyn (ed.)	A Gazetteer of Welsh Place-Names.
228	Young, G.	Snowdon Biography.
246	Farre, R.	Seal Morning.
275	MacCulloch, D. B.	The Wondrous Isle of Staffa.
300	Kaverin, V.	Two Captains.
300	Obruchev, V. A.	Plutonia, an Adventure Through Pre-history.
301	Cheeseman, E.	Things Worth While.
301	Buchan, J.	Montrose.
304	Powell, Col. A. N. W.	Call of the Tiger.
304	Grieshaber, H.	30 Years Travelling Round the World.
304	Cotlow, L.	Zanzabuku, dangerous Safari.
307	O'Brian, C.	Atlantic Adventure.
309	Coverly-Price, V.	An Artist Among Mountains.
311	Cadoux, J.	One Thousand Metres Down.
312	Raitt, H.	Exploring the Deep Pacific.
312	Hobley, L. F.	Exploring the Pacific.
313	Wallace, C.	Pictorial Treasury II—the British Commonwealth.
350	Williams, E.	Complete and Free.
372	Gibbon, M.	The Rhine and its Castles.
386	Carson, A.	Train to Tarragona.
386	Blake, W. T.	Spanish Journey.
386	Starkie, W.	The Road to Santiago.
391	Luke, Sir H.	Cyprus.
392	Loch, S.	Athos, the Holy Mountain.
401	Cloete, S.	The African Giant.
402	Marriott, M.	Desert Taxi.

Class Number	*Author*	*Title*
416	Busk, D.	Fountain of the Sun.
422	Scobie, A.	Adventurer's Paradise.
424	Pollard, J.	Adventure Begins in Kenya.
450	Peterson, R. & Fisher, J.	Wild America.
476	Attenborough, D.	Zoo Quest to Guiana.
480	Dolinger, J.	Girl Friday.
484	Anderson, W. E.	Expedition South.
485	Metraux, A.	Easter Island.
504	Shah, S. I.	Destination Mecca.
508	Frossard, A.	A Modern Pilgrim in the Holy Land.
512	de Schooten, M. T. U.	Lords of the Mountains.
515	Hardie, N.	In Highest Nepal.
515	Weir, T.	East of Katmandu.
515	Tichy, H.	Cho Oyu.
516	Egler, A.	The Everest-Lhotse Adventure.
516	Roberts, D.	I'll Climb Mt. Everest Alone.
530	Bailey, F. M.	No Passport to Tibet.
530	Mele, P. F.	Tibet.
539	Ogrizek, D.	Japan.
549	Taylor, D.	Ten Stars South of Asia.
550	Chaseling, W.	Yulengor, Nomads of Arnhem Land.
550	Duncan, S.	Two Wheels to Adventure.
550	Miles, B.	The Stars My Blanket.
570	Morton, E. K.	Crusoes of Sunday Island.
591	Brown, P. L.	Twelve Came Back.
592	Simpson, C. J. W.	North Ice.
653	Carr, A.	The Windward Road.

Section C. Text Books

805	Bagrow, L.	Imago Mundi.
805	Bygott, J.	An Introduction to Mapwork.
807	Miller, F. M.	The Physical Basis of Geography.
825	du Toit, A. L.	Our Wandering Continents.
826	Read, H. H.	Granite Controversy.
829	Charlesworth, J. K.	The Geology of Ireland.
830	de Menzes, L.	Geologia de Portugal.
831	du Toit, A. L.	Geology of South Africa.
847	Blewitt, M.	Survey of the Seas.
847	Herrmann, E.	Das Nordpolarmeer.
855	Isard, W.	Location and Space Economy.
856	Proudfoot, M. J.	European Refugees.
858	Economist Intelligence Unit	An Economic Geography of the Commonwealth.
863	Kruger, K.	Ingenieure Bauen die Welt.
872	Church, R. H.	Geographical Essays on British Tropical Lands.
876	Bird, J.	The Geography of the Port of London.
877	Ogilvie, A. G.	Europe and its Borderlands.
877	Platt, R. A.	Finland and its Geography.
877	Boettcher, D. R. P.	Das Tessintal.
881	Church, R. J.	West Africa.
882	Warriner, D.	Land Reform and Development in the Middle East.
882	Stamp, D.	Asia.
882	Thiel, E.	The Soviet Far East.
900	Cundall, L. B.	The Enterprise Geographies, Book III.
900	Wood, G. A.	Geography in Schools.
900	Hobbs, J. S.	General World, Physical and Human Geography.
900	Herdman, T.	Europe and the British Isles.

The Geographer as Scientist

essays on the scope and nature of geography

by **S. W. WOOLDRIDGE CBE DSC FRGS**
Professor of Geography in the University of London, King's College.
'This collection of essays . . . well illustrates the great development which has taken place in this discipline since the granting of the first honours degree in London in 1921. . . . The whole is written with a vitality which has not diminished over the years, from a breadth of vision and with a turn of phrase which has made the subject live.'
The Times Literary Supplement

30 maps and diagrams *312 pages* *35s*

Human Types

new and revised edition

by **RAYMOND FIRTH FBA** *Professor of Anthropology, University of London.* This introduction to social anthropology now embodies much new material.

17 halftone plates *224 pages* *8s 6d*

Europe and its Borderlands

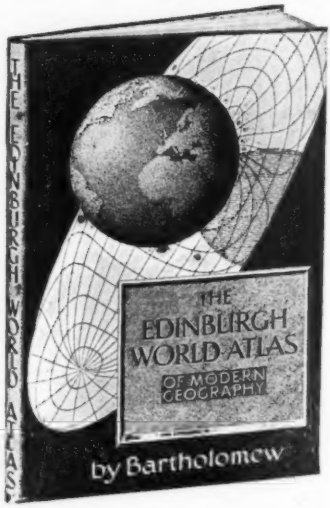
a comprehensive geographical treatise

by **ALAN G. OGILVIE,** *late Professor of Geography in the University of Edinburgh.* 'Readers with a good sound factual background knowledge will appreciate points of view which are fresh and often unusual, sometimes controversial, occasionally obscure. Teachers will find this an interesting work to put in the hands of a good sixth form and watch the reactions. . . . It is certainly a book worth trying to follow closely: not least for the carefully designed maps which are often highly original and packed with information too often neglected.' *The Times Educational Supplement*

88 maps and diagrams *352 pages* *42s*

NELSON

THE EDINBURGH WORLD
ATLAS OF MODERN GEOGRAPHY



NEW EDITION JUST PUBLISHED

Having been thoroughly revised, this important atlas is now issued in its second edition.

Essentially it is a reference atlas in contour colouring, with a modern approach which facilitates the study of geography in the scientific world of to-day.

Important distributions such as Vegetation and Density of Population are given special emphasis by continents, together with maps of comparative Rainfall and Temperature. World subjects include Climatology, Oceanography, Geology, Agriculture, Ethnology, etc. It contains detailed introductory geographical tables and an index of 24,000 names.

168 pages. Size 14½ in. × 10 in. **Price 36s.**

Available from your bookseller.

JOHN BARTHOLOMEW & SON LIMITED

12 Duncan Street, Edinburgh 9

Printed in Great Britain by
T. & A. CONSTABLE LTD., Edinburgh